NATURAL RESOURCES MANAGEMENT PLAN

and

Management Program

LASSEN VOLCANIC

APRIL 1984 REVISION

Prepared by

LASSEN VOLCANIC NATIONAL PARK

California

NATIONAL PARK SERVICE / DEPARTMENT OF THE INTERIOR

NATURAL RESOURCES MANAGEMENT PLAN

Lassen Volcanic National Park
California

Prepared by
Lassen Volcanic National Park
National Park Service
Department of the Interior

July 1979
Revised April 1984

Submitted by: _____ Date 4/2/84
W. Stephenson, Superintendent

Approved by: _____ Date 4/27/84
Howard H. Chapman, Regional Director

PREFACE

The original 1979 Natural Resources Management Plan for Lassen Volcanic National Park contained an Environmental Assessment. The plan and assessment received public review during February 1980. Reference copies of the Environmental Assessment are available at Park Headquarters, Lassen Volcanic National Park, Mineral, California 96063 and the National Park Service, Western Regional Office, 450 Golden Gate Avenue, San Francisco, California 94102. The 1979 Environmental Review follows, for reference purposes.

ENVIRONMENTAL REVIEW

The Natural Resources Management Plan for Lassen Volcanic National Park proposes research and management actions to accomplish management objectives for the park. The plan approaches resource management in three broad categories: 1) terrestrial ecosystems, 2) aquatic ecosystems and 3) human use.

PROPOSED ACTIONS. The specific actions proposed are grouped under two broad categories: 1) research and monitoring and 2) management. Research and monitoring proposals are designed to provide inventories of basic park resources, classify ecological types, describe life histories of special interest plant and animal species and monitor resources to detect effects of management and use.

Management actions include elimination of grazing, promoting natural dispersal of bears, controlling conditions that are hazardous to people and property and restoring natural habitats and processes.

IMPACTS. Principal impacts of the plan are restoration of natural conditions and processes and controlling use to prevent environmental deterioration. Specific impacts include some fencing to prevent livestock trespass, relocation of problem bears, removal of hazard trees in developed areas, controlling insect and animal populations where necessary to prevent spread of disease to humans and temporary blackened landscapes and smoke concentrations from fire management practices.

ALTERNATIVES. No action was considered for each proposed action and would mean maintaining current conditions which would in most cases promote further alterations of natural systems from grazing, uncontrolled human use, invasion of exotic species and continued loss of ecological diversity. Other alternatives vary from minimum to maximum levels of manipulation such as allowing grazing in certain areas, total fire suppression or allowing all fires to burn, relocating existing developed sites away from mature forest sites and allowing uncontrolled visitor use. The alternatives were not selected generally because they would not provide optimum restoration or retention of natural systems.

CONCLUSION. None of the proposals can be considered major or controversial Federal actions nor will they significantly affect quality of the environment, therefore no environmental statement will be prepared.

3/21/79
Date

Superintendent, Lassen Volcanic National Park

JUL 13 1979
Date

Regional Director, Western Region

Digitized by the Internet Archive
in 2012 with funding from
LYRASIS Members and Sloan Foundation

http://archive.org/details/naturalresources00lass

TABLE OF CONTENTS

NATURAL RESOURCES MANAGEMENT PLAN

PREFACE i

ENVIRONMENTAL REVIEW ii

LIST OF TABLES AND FIGURES iv

INTRODUCTION 1

MANAGEMENT OBJECTIVES 1

MANAGEMENT AND RESEARCH ACTIONS 2

TERRESTRIAL ECOSYSTEMS 2
- Resource Inventories 2
- Ecological Classification 3
- Endangered and Threatened Species 3
- Extirpated Species 5
- Exotic Species 5
- Native Animals of Special Interest 6
- Geological Monitoring 7
- Hazard Trees 8
- Vector Control 8
- Fire Management 9
- Air Quality 9

AQUATIC ECOSYSTEMS 9
- Water Resources 11
- Aquatic Organisms 11
- Fisheries 11
- Natural Drainage Patterns and Water Diversions 12
- Control Pollutants 12

HUMAN USE 12
- Controlling Use 12
- Monitoring Use 12

RELATIONSHIPS OF THE PLAN TO OTHER PROJECTS 13

LITERATURE CITED 14

ADDENDUM: Natural Resources Management Program
59 pages includes separate Table of Contents

LIST OF FIGURES AND TABLES

Page

FIGURE 1 - Lassen Fire Management Planning Area..... 10

TABLE 1 - Plant Species in Lassen Volcanic National Park
Proposed for Endangered Status..... 4

INTRODUCTION

Lassen Volcanic National Park, located in Northern California at the southern extreme of the Cascade Mountain Range, comprises 43,080 hectares (106,372 acres) of high mountains and valleys. Elevation ranges from 1,616 meters (5,300 feet) in Warner Valley to 3,183 meters (10,453 feet) at the summit of Lassen Peak.

The general land form is largely the result of volcanism and glaciation so that flat-topped ridges and rounded valleys contrast with steep mountains and narrow valleys. Volcanic activity continues as a dynamic process evidenced by the many active thermal areas found in the park.

The park is well watered, having over a dozen perennial streams of significant size and several hundred lakes ranging in size from intermittent snow ponds to 232 hectares (573 acres) at Juniper Lake.

Climatically the region is typical of high mountains with relatively cold winters and cool summers. Most of the annual precipitation occurs as snowfall during winter, which in parts of the park, exceeds nine meters (30 feet) per year. Summers are generally dry with clear skies but occasionally thunderstorms occur, especially in late summer.

Floral diversity and plant distribution is complex. The park is near the junction of two mountain ranges, the Cascade and Sierra Nevada, and, as a result, there are species characteristic of both ranges. Seven hundred fifteen plant species representing 74 families have been identified in the park.

The diversity of geologic formations, the variable terrain, and the abundance of vegetation in the park have all contributed to development of a great diversity of faunal niches and habitats. About 50 kinds of mammals, 150 birds and 12 different amphibians are native to the area.

MANAGEMENT OBJECTIVES

Lassen Volcanic National Park is managed according to current National Park Service policy and law for the continuous protection and maintenance of park resources. Within these broad guidelines, the following specific objectives have been adopted for management of the park's natural resources:

Provide for management and use that do not impair present or past evidences of volcanic activity.

Restore and maintain the terrestrial and aquatic ecosystems as they most probably existed prior to technological disturbance by man.

Develop and execute continuing research programs for natural resources.

Restore and maintain terrestrial and aquatic ecosystems as they would have existed today without disturbance by technological man.

Implement this resources management plan based on data from natural resources research. Monitor and manage fire, insect infestation and plant disease as natural controlling agents in the forest ecosystems.

Maintain and, where necessary, restore aquatic ecosystems in a natural state while allowing recreational fishing to continue in selected bodies of water at levels that allow natural processes to continue.

Collect background data and formulate management plans for deer and beaver in the park in cooperation with the California Department of Fish and Game and the Forest Service.

MANAGEMENT AND RESEARCH ACTIONS

In order to achieve the park's resource management objectives, both management and research action programs are needed. Management actions are proposed that will correct or prevent resource related problems where sufficient basic data are available to assure their reasonable accomplishment. Where sufficient data are lacking, research projects are proposed that will supply information bases to fill gaps in previous research as a prerequisite to the formulation of management action plans.

In keeping with the current Service policy to perpetuate total ecosystems as opposed to the protection of individual features or species, this plan addresses natural resource problem areas in three broad categories: 1) terrestrial ecosystems, 2) aquatic ecosystems and 3) human use. Although some of the subcategories may appear to emphasize individual features, species or biogroups, the breakdown is merely a means of identifying problem areas and seeking solutions at a level that is feasible with regard to time and money, and in all cases, due consideration for the relationships within and between the various systems intended.

TERRESTRIAL ECOSYSTEMS

RESOURCE INVENTORIES: One of the most obvious problem areas relating to the park's terrestrial ecosystems is the lack of complete resource inventories which, together with ecological classifications, are required to form the basis for future management. Vascular plants of Lassen Park have been the subject of considerable study in the past. As a result, a comprehensive flowering plant list and herbarium are available so a total inventory of that group is not needed. However, to complete the inventories of producer and decomposer organisms, those vascular plant species missed in the previous research, as well as a listing of significant non-vascular plants and decomposer species, will be compiled in conjunction with the proposed ecological classification research discussed in the following section.

A file of natural history observation reports is maintained at Park Headquarters and will form the basis for an inventory of consumer organisms. This information, coupled with an appropriate literature review and field surveys, will be used to compile a species list of all vertebrates and all significant invertebrates found in the park.

Abiotic resources inventories for the park are limited, but information sufficient to complete the proposed inventory of significant geologic features and processes is available in the park files, in various reports of geologic investigations and in local historic literature.

All of the relevant abiotic resources inventories will come from the proposed ecological classification research or from the various proposed research projects relating to aquatic ecosystems.

ECOLOGICAL CLASSIFICATION: Previous efforts at community classifications have mostly been delineations and descriptions of forest cover types. In 1966, the most recent cover type map was completed and is reasonably accurate regarding forest tree composition of the various stands, but does not describe the diversity of species present nor recognize a number of important and unique communities and their interrelationships.

Ecological classification, description and analysis at the level which this plan proposes is rather extensive and complex, but lends itself quite readily to an incremental approach.

As a first step, the various ecosystems will be classified and mapped and their compositions (both biotic and abiotic) described. This will be followed by an analysis of the ecological relationships within and among the various communities, with highest priority for study being assigned to those communities that are experiencing or have experienced man-induced alterations.

ENDANGERED AND THREATENED SPECIES: Three plant species listed or being reviewed for endangered or threatened status by the U.S. Fish and Wildlife Service in the Federal Register, December 15, 1980 (Volume 45, Number 242) are found in the park. In addition, the presence in the park of seven subspecies and varieties on the Federal list needs to be confirmed (Table 1). The species occur at Lassen, and, although the park is in the range of the suspecific forms, the subspecies and varieties have not been specifically identified in the park. It is proposed that a comprehensive atlas of these plants and their distribution and habitat requirements be prepared for use in determining effects of future management actions and, where necessary, in preparing plans for thier perpetuation.

Two endangered animal species are found in the park: The southern bald eagle, Haliaeetus leucocephalus leucocephalus, and the American peregrine falcons, Falco peregrinus anatum. Research on the status of both species was completed in 1982. Results of the research indicate a single pair of bald eagles nests near Snag Lake, apparently alternately with other nest sites outside the park. Hunting territory for this pair comprises most of the eastern half of the park. The only other

known bald eagle activity is early spring foraging use of the Manzanita Lake area by eagles nesting fifteen kilometers west of the park at McCumber Reservoir.

Current peregrine falcon activity in the park is limited to occasional hunting in the higher elevations around Lassen Peak in late summer, apparently in response to an upward shift of prey species. Several potential nest sites were located during field research, but no active nests were found.

As recommended in the research report, monitoring will be implemented to evaluate:

The extent of hunting use in the park.

The incidence of line strikes on the new chairlift at the Lassen Park Ski Area.

Any reoccupation of potential nest sites.

TABLE 1

Plant species in Lassen Volcanic National Park proposed for endangered status (Federal Register, Volume 41, No. 117, June 16, 1976.

Species and/or subspecies known to occur in the park:

Dicanthelium lanuginosum var. thermale (Hot springs panic grass)

Smelowskia ovalis ssp. congesta (No common name)

Trifolium lemmonii (Lemmon's clover)

Species occur in the park - occurrence of subspecies needs confirmation:

Arabis breweri var. pecuniaria (Rockcress)

Brodiaea coronaria var. rosea (No common name)

Dicentra formosa ssp. oregana (Pacific bleedingheart)

Eriogonum nudum var. murinum (Mouse wild buckwheat)

Eriophyllum lanatum var. hallii (Fort Tejon wooly sunflower)

Erysimum capitatum var. angustatum (Contra Costa wallflower)

Stipa lemmonii var. pubescens (Crampton spear grass)

EXTIRPATED SPECIES: Historical research is proposed to determine as accurately as possible the pre-Columbian biotic composition of the park so those species and processes lost or altered by modern man's activities may be considered for reintroduction as a means of restoring those primitive systems.

In addition to the general historic research, the immediate specific actions proposed are in-depth investigations of the current status of wolverines and fishers in the park, and an analysis of the feasibility of reintroducing bighorn sheep.

EXOTIC SPECIES: Two classes of exotics (plants and livestock) have been identified as causing or having potential for causing problems.

Beavers in the park are believed to be descendants of introduced stock, so are discussed here also.

Plants. Based on information available in 1961, there were 23 exotic plant species sufficiently widespread in the park to be readily located. Some species undoubtedly are competing with the native vegetation on some sites or have occupied disturbed areas and may be delaying succession by native species. The initial action proposed is monitoring to detect any displacement of native species. Control measures will be implemented, if found necessary and feasible.

Beavers. Historic research on the native status of beavers on Hot Springs Creek in the park has been completed. Based on an in-depth review of the literature, the report concludes beavers were not native in Warner Valley, and those inhabiting the area are from stock introduced outside the park. The report recommends population control to comply with Service policy.

The extent of beaver activity has been mapped, and an environmental assessment will be considered in selecting a preferred alternative for future management.

Livestock. The grazing of domesticated livestock is considered a nonconforming use in the park since it contributes to unnatural changes both in plant species composition and plant abundance. The grazing problem has been partly corrected; concessioner horses formerly pastured in the meadow at Drakesbad are now kept in a corral and fed there. All fences in the meadow have been removed and recovery of meadow vegetation along former fence lines already evinces a blending with adjacent ungrazed sectors. However, trespass grazing continues to occur at varying levels during the summer season.

Previous efforts at curtailing trespass grazing have not been successful, so a combination of approaches will be tried.

Drift fences will be installed and maintained as a cooperative effort with the Forest Service and their permittees; patrols by

Park Rangers will be intensified, and, where necessary, legal action will be taken to achieve satisfactory control.

NATIVE ANIMALS OF SPECIAL INTEREST: Two species of native animals have been identified for special attention because of their potential impacts on the environment or their potential for conflict with man.

Deer: Lassen Park is summer range for two subspecies of mule deer:

Rocky Mountain mule deer (Odocoileus hemionus heminus)
Black-tailed deer (O. heminonus columbianus)

Exact distribution of the two is not known, but mule deer are found generally in the eastern one-third of the park while the black-tailed deer are distributed throughout the park. Available data are not sufficient for an accurate estimation of deer numbers.

Nevertheless, deer in the park are abundant and in some areas numbers apparently exceed the carrying capacity of the range. Range problems associated with deer use were identified by Donart (1968). He located key browse areas, analyzed vegetation on the key areas, identified additional research needs and recommended management actions. Because of the conditions identified by Donart, and because the park constitutes an important fawning region and summer range for these migratory deer, the following actions are needed before a realistic deer management plan be devised:

A life history study is proposed to determine reasons for lack of reproduction and generally declining distribution of willows which constitute a bulk of the preferred browse for the deer in some areas of the park. Alder, which commonly occurs on the same sites as willow, will be included in the study to determine its value to deer, especially as cover during fawning.

Permanent transects will be established in key areas in order to obtain information on annual forage supplies, degree of deer pressure and condition and trend of preferred and staple browse species.

Deer herd composition counts will be conducted for use in determining fawn production and survival rates. In conjunction with the counts, the extent and distribution of fawning areas will be determined. Migration patterns also are not definitely known, so studies will be needed to determine routes to and from the park to more accurately assess the influences of external management practices on these deer.

A more refined deer management plan will be formulated in cooperation with the California Department of Fish and Game following accumulation of sufficient data to enable defining realistic objectives.

Bears. Lassen has an estimated population of 10-20 black bears (Ursus americanus). Because the park is quite small, it is probable that most, if not all individuals, include the adjacent national forest in their range.

Problems with bears have not been extensive or very serious. There have been no reported personal injuries since annual summary reporting of bear incidents were begun in 1969. During the period from 1969 through 1980, there were 94 bear incidents involving $1,051 in property damage; the annual average being eight incidents and $88 in damages.

In 1981 to reduce the potential for a more serious bear incident and to promote a more nearly natural dispersal of bears, management action in four categories was implemented:

Improve garbage collection practices so bears are not attracted to collection sites.

Work cooperatively with the California Department of Fish and Game when necessary to relocate problem bears.

Standardize bear incident reporting procedures.

Intensify visitor education on proper behavior to avoid bear encounters.

The effect of the management action was a significant reduction in the number of bear incidents; two in 1981, three in 1982 and none in 1983. In addition, no property damage was reported in either of the three years. However, the need to relocate bears was not significantly reduced; an aggressive yearling had to be relocated in 1982. Because the bear population in Lassen is small and because there has been an increase in bear poaching activity adjacent to the park, the practice of relocating bears outside the park will be reevaluated and either more stringent reasons for relocation will be applied or relocations will be made to areas inside the park.

GEOLOGICAL MONITORING: Installation of eight geological monitoring instruments in the park was completed in 1976. Two tiltmeters, installed on Lassen Peak, will measure any change in the angle of the surface of the peak. Any significant change may indicate renewed volcanic activity.

Four seismometers have been installed in addition to the one in operation at Park Headquarters. These are located at the Southwest Entrance, at Manzanita Lake and on Lassen and Reading Peaks and will measure and pinpoint the exact location of any subsurface movement within the park. They will also provide specific information about subsurface structures.

Two inclinometers were installed on Chaos Crags to measure movement of the surface formation. There is usually some minor slippage prior to a

major avalanche. However, rockfall avalanches are particularly dangerous because, unlike volcanic eruptions, they give no appreciable warning. These instruments will in no way make the Chaos Crags a safer place for visitors, but will provide data which can be used in future planning.

All eight instruments are connected by radio and open telephone line to the U.S. Geological Survey Earthquake Laboratory in Menlo Park, California, and are monitored 24-hours a day.

The information gathered from this system will add greatly to the understanding of earthquake and volcanic phenomena. It will provide the park staff with the means of preparing the most effective warning and evacuation plan in the event of renewed volcanic activity in the Lassen area.

Geothermal. The Lassen National Forest proposes leasing lands adjacent to the park for geothermal development. The park is concerned that exploration drilling or development may adversely affect the thermal resources within the park and the esthetic qualities of the general area.

Investigations by the U.S. Geological Survey have delineated the volcanic history of the area and the chemical characteristics of the surficial thermal features. Various geophysical studies, as well as results obtained in a 1,200 meter deep drill hole near Terminal Geyser, provide additional data on subsurface conditions.

In order to assess the impact of geothermal exploration and development, U.S. Geological Survey scientists will continue chemical monitoring begun in 1982. They will remeasure the gravity network set up in 1982 to verify gravity stability and to assess the level of seasonal gravity fluctuation.

HAZARD TREES. Most of the developed areas in the park are located on sites with overmature timber so that each year, as more trees become decadent or diseased, the number having potential for failure increases. In the past, trees have been selected for removal based on the judgment of one or more individuals so that trees of varying degrees of defect and failure potential have been removed.

The proposed future hazard tree control program will attempt to standardize the method of selecting trees for removal or pruning by following the criteria established by Lee Paine (1971). Additionally, in selecting sites for future development, careful consideration will be given to avoiding sites having significant numbers of mature trees.

VECTOR CONTROL. Pasteurella pestis, the source of sylvatic plague, occurs at varying levels in wild rodent populations in and around Lassen Park. Control is required when epizootics occur in developed areas of the park. In cooperation with State health officials, the park staff monitors developed sites for plague indicators. If plague is found to occur, control measures are implemented. Control normally

consists of reducing flea incidence on rodents by either application of pesticide directly in burrows or by placing baited dusting boxes in the area affected.

In order to reduce or eliminate use of chemical pesticides for controlling plague epizootics, an integrated pest management program will be prepared for the Manzanita Lake, Crags and Summit Lake areas. An holistic approach will explore such facets of pest management as biological controls and habitat manipulations, as well as the traditional methods of trapping and chemical treatment.

FIRE MANAGEMENT: To adequately restore and maintain the park's natural terrestrial ecosystems, requires all elements of those systems be allowed to function. Fire is one dynamic element which has not been permitted to function naturally, since total suppression of all fires has been administered effectively for at least the past 70 years. As a result some plant communtities are disappearing and in others, fuel accumulations are becoming dangerously high. In still others, such as subalpine forest, suppression activities often result in more devastating impacts than the fires themselves.

Fire management planning and implementation is coordinated with Lassen National Forest which completely surrounds the park. A joint Fire Management Plan for the park and the adjacent Caribou Wilderness Area was completed and approved in 1982. The plan allows for restoring the natural role of fire in the wilderness and park ecosystems through a combination of fire management activities, including control, confinement, containment and the employment of prescribed fire from both scheduled and unscheduled ignitions.

AIR QUALITY. The park has been formally designated as Class I under the terms of the Clean Air Act as amended August 1977. A preliminary assessment of Class I related values has been completed and did not identify any undesirable visibility impairment for the area. In order to maintain existing high quality air, telephotometer readings are taken three times daily at the panoramic view from Windy Point, and a particulate sampler has been installed at Manzanita Lake. Data from these sampling stations are analyzed by contract staff at the University of California, Davis, and by Air Resources Specialists at Fort Collins, Colorado. In addition to monitoring, all park programs are conducted within applicable National and California standards, and cooperative efforts with local entities are maintained in order to minimize air quality deterioration in the park from outside sources.

AQUATIC ECOSYSTEMS

WATER RESOURCES: On October 18, 1972, Congress enacted Public Law 92-500, "Federal Water Pollution Control Act Amendments of 1972". On December 15, 1977, Congress amended the 1972 Act by passing Public Law 95-217, "Clean Water Act of 1977". The law states that, "Each ... agency ... of the Federal Government having jurisdiction over any property ... shall be subject to and comply with all Federal, State, interstate and local requirements ...".

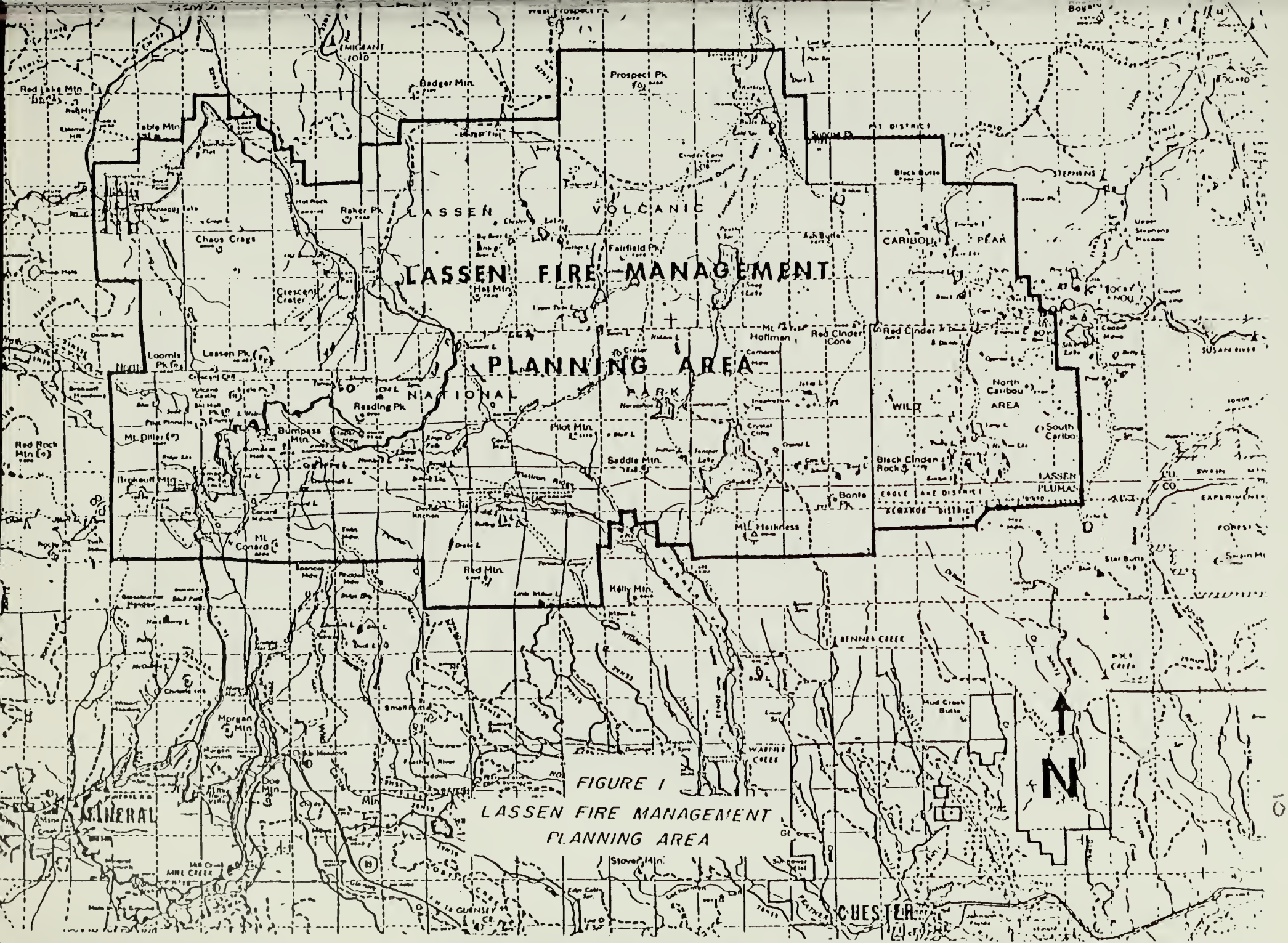

FIGURE 1
LASSEN FIRE MANAGEMENT
PLANNING AREA

As an outcome of the above laws, a Memorandum of Understanding between the National Park Sevice and the Environmental Protection Agency has been established. This requires an analysis of present park waters and a resulting classification of these waters for future uses.

A detailed water management action plan for the park will be prepared. The plan will document historical water-related management practices, classify surface waters according to use, describe proposed actions that relate to park waters, and detail monitoring needs, that will reveal existing water quality and significant trends.

AQUATIC ORGANISMS: Previous aquatic resources studies have been related to their potential as fisheries, so have had in-depth evaluations of only those elements that are beneficial or detrimental to game fishes. Inventories of the entire spectrum of biotic and abiotic elements of all aquatic ecosystems are proposed and future studies will emphasize anlaysis of their ecological relationships.

FISHERIES: The validity of current Service fishery management policy as it involves the national parks in the State of California has been questioned by California Department of Fish and Game and by some sportsmen's groups. Because of this, the Service and California Department of Fish and Game completed a study in 1978 of the biological, recreational and economic impacts of the Service's no stocking policy. More recently a Department of the Interior Interagency Ad Hoc Committee prepared a report on the National Park Service aquatic resource policies and practices. The NPS will carry out an internal study and analysis of this report because concern exists over data gaps and general poor quality of the report. Before completing such an analysis, the National Park Service's Washington Office will consult on the matter with State fish and game agencies represented by the Western Association. It is difficult to envision the issue being closed prior to early 1985 due to the past history, demands from both within and outside the NPS, plus prevailing normal legal demands on processing policy and regulatory matters. Meanwhile annual stocking of rainbow trout will continue at the same level as 1974.

Regardless of whether or not changes in fisheries management practices occur, some further investigations are needed. Many of the fishery resources have been the subject of either extensive or intensive research since the mid-1950's, but the material is largely fragmented. The most recent investigations have been of an inventory nature. All lakes in the park have now been located and listed and general biological and physical surveys have been completed on all those that apparently have potential for supporting fish life. It is now proposed that surveys of all streams in the park be completed and some further in-depth investigations in significant water bodies be completed before consolidating data from the past investigations and recommending future management actions.

Initially, proposed management actions include monitoring physical and biological components of selected waters to detect any changes that are occurring as a result of the past or current management and use.

NATURAL DRAINAGE PATTERNS AND WATER DIVERSIONS: Historically, some of the natural drainage systems in the park have been altered. The most obvious of these are Manzanita and Reflection Lakes. In the mid-1800's, a dam was constructed on Manzanita Lake and water was diverted from Manzanita Creek to Reflection Lake; The principal purposes were to provide for water power and to improve fish production. Because these alterations have an historic basis, they will not be obliterated. To prevent breaching and downstream flooding, maintenance of the Manzanita Lake dam will continue until natural siltation fills in the impoundment. The Reflection Lake diversion exists in the flood plain of Manzanita Creek and apparently is not a significant variation from natural conditions. Therefore, it will be maintained until further evaluation determines whether or not it is an acceptable remedy to stream flow changes caused by construction of the park road between the lake and Manzanita Creek.

Direct action will be used to restore natural drainage patterns in Warner Valley, which were altered to more evenly distribute water in the meadow for livestock grazing. Determination of the full extent of alteration will be accomplished first, then primitive flow patterns will be restored.

Three alien water rights exist in the park. Two are currently being evaluated for their validity and to determine the level of maintenance and rehabilitation to existing diversion structures that will be permitted. The same sort of evaluation is proposed for the third.

Following completion of these analyses, a determination will be made to either eliminate these rights or institute fully defined controls of all uses associated with them.

CONTROL POLLUTANTS: Current water quality monitoring is largely related to maintaining safe supplies for human use. A schedule of periodic sampling and testing will be instituted in all park waters where existing sewage systems or human use levels are such that contamination might result and cause changes in the natural composition of such waters.

HUMAN USE

This plan concerns itself only with human use in the wilderness and backcountry. Frontcountry use is the concern of the General Management Plan and various Development Concept Plans.

CONTROLLING USE: A Wilderness and Backcountry Management Plan for the park received National Park Service regional approval in 1973 and currently is being implemented. The plan provides for controlling use through a number of restrictions which include designated site camping areas, party size and length of stay limitations and closure to overnight use of some heavily impacted or fragile areas. A permit system is employed to control overnight use distributions and to collect data on use patterns. Limitations on permissible management and maintenance activities also are provided for in the plan.

MONITORING USE: Current restrictions on backcountry and wilderness use are somewhat arbitrary, so a use-monitoring system is proposed which will provide information to enable evaluation of those restrictions and the relationship of use intensity to impacts on the resources. Monitoring procedures will be designed to obtain the following information at use sites throughout the backcountry.

Areas of bare soil, trampled vegetation, firewood gathering, tree damage and trash dispersal.

Numbers of fire pits and other visitor constructed development.

Notation of water quality, vegetation types, topography and location of trails.

These data will be analyzed and compared with visitor use statistics to determine whether more restrictive controls are needed, or if existing restrictions can be relaxed.

INTERRELATIONSHIPS OF THE PLAN TO OTHER PROJECTS

The Lassen Natural Resources Management Plan has some effect on, and is influenced, by a number of other plans and projects. The Lassen General Management Plan, The Wilderness Act and the Lassen Wilderness Act each includes guidelines within which the Natural Resources Management Plan was prepared.

The California Department of Fish and Game's Tehama and Cow Creek Deer Herd Management Plans and land use plans for the adjacent Lassen National Forest, all relate to some of the same influences as this plan and require cooperative efforts for proper implementation of all projects.

The U.S. Fish and Wildlife Service endangered and threatened species program is directly related to the endangered species section of this plan and close relationship will need to be maintained to ensure perpetuation of endangered wildlife and plants and their habitats in the park.

Proper implementation of the Fire Management Plan will require cooperation with the Forest Service and Bureau of Land Management who locally are mutual-aid fire suppression cooperators with Lassen Volcanic National Park.

LITERATURE CITED

Donart, G.P., 1968. Analysis of deer browse conditions and ecological relationships in Lassen Volcanic National Park. Department of Range Management, Humboldt State College. Arcata, CA.

Kilgore, B.M., 1971. The role of fire in managing red fir forests. Trans. 26 North America Wildlife and Natural Resource Conference, Wildlife Management Institute. Washington, DC.

Paine, L.A., 1971. Accident hazard evaluation and control decision on forested recreation sites. USDA Forest Service Research Paper PSW-68. Pacific Southwest Forest and Range Experiment Station. Berkeley, CA.

NATURAL RESOURCES MANAGEMENT PROGRAM

AN ADDENDUM TO THE NATURAL RESOURCES MANAGEMENT PLAN FOR LASSEN VOLCANIC NATIONAL PARK

Prepared by
LASSEN VOLCANIC NATIONAL PARK
NATIONAL PARK SERVICE

April 1984

TABLE OF CONTENTS

	Page Number
INTRODUCTION	1
OVERVIEW AND NEEDS	2
NATURAL RESOURCES PROJECTS PROGRAMMING SHEETS	4
LIST OF CONTINUING AND PROPOSED PROJECTS	7
PROJECT STATEMENTS	
Inventory Terrestrial Communities, N-33	8
Meadow Ecology, N-34	10
Chaparral Ecology, N-35	12
Endangered Plant Survey, N-36	14
Analyze Vegetation History, N-37	16
Willow and Alder Ecology, N-38	18
Inventory Aquatic Biota, N-40	20
Resource Inventory--Streams, N-41	22
Lake Ecology, N-42	24
Wolverine and Fisher Status Survey, N-43	26
Study Feasibility of Reintroducing Bighorn Sheep, N-44	28
Park Water Resource Management Plan, W-1	30
Monitor Potential Rockfall--Diamond Peak, W-2	32
Map Geologic Features, W-3	34
Monitor Endangered Raptors, RM-1	36
Beaver Census and Habitat Survey, RM-2	38
Deer Herd and Habitat Monitoring, RM-3	40
Bear Management, RM-4	42
Forest Fuel Inventory, RM-5	44
Monitor Natural Fire, RM-6	46
Prescribed Fire, RM-7	48
Monitor Aquatic Ecosystems, RM-8	50
Restore Historic Drainage Patterns, RM-9	52
Backcountry Use Monitoring, RM-10	54
Monitor Air Quality, RM-11	56
Geothermal Exploration Impact, W-4	58

INTRODUCTION

The Management Program is the action document which implements the Natural Resource Management Plan and consists of the following:

1. Overview and Needs.

2. Natural Resources Projects Programming Sheets listing each project and showing: its relative park priority; funding availability and requirements; and a time schedule for a five-year period. Project will be carried out when requested funds become available.

3. Natural Resources Projects that serve as "blue-prints" for proposed actions.

While the Natural Resources Management Plan is concerned with a proposed long-term action program, the management program deals with the next five years only. The program presented here begins with Fiscal Year 1984. Each subsequent year the management program will be revised and updated for a new five-year period as work is completed and new projects are proposed.

OVERVIEW AND NEEDS

All of Lassen Park's significant resources problems relate to altered or destroyed natural systems or processes. These problems exist primarily because of the activities of modern man and include in-house management and use as well as external land use and political influences. The most significant, specific problems include changes resulting from fire exclusion, concentrated visitor use, introduced exotic species and trespass grazing. Of lesser effect, but still significant, are unnatural behavior of some native animals and depressed or lost populations of other native species. Another problem area that may prove to be more significant than all others is a lack of knowledge about the basic composition and function of many ecosystems. In many cases we do not know what constitutes the resource being managed nor the effect that sometimes arbitrary management and use is having on the individual components and ultimately on the system as a whole.

The ideal problem solution approach would be to determine in considerable detail what constitutes the park's natural systems and how they function. Following that, necessary corrective or restorative action could be identified and implemented. Although ideal, this approach is not very realistic. Damage to some resource components is extensive enough to require immediate corrective action. Therefore, it is necessary, to do some active management of damaged resources. At the same time, research is needed to provide basic inventories and to identify hidden cause and effect relationships. Finally, monitoring will be needed to detect adverse changes requiring correction and to determine the effects of ongoing management programs.

Priority ranking of proposed management, research and monitoring projects is based on the existing and projected extent of resource damage that the problem will likely cause. Based on this criterion, the proposed five-year program for Lassen Park includes 14 research projects, three management projects and three monitoring proposals.

Fiscal Year 1985. The most extensive existing and potential damage has resulted from concentrated visitor use at backcountry sites. The full extent of damage will be documented by ecological research and monitoring of both terrestrial and aquatic ecosystems. Endangered raptors will be managed to maintain, or, where possible, enhance historic population levels. To begin accumulating needed baseline data, a vegetation-type inventory is proposed.

Fiscal Year 1986. Research and monitoring started in FY 1985, will be continued and the existing fire program will be expanded to utilize prescribed fire for fuel reduction and to restore natural conditions. New research will be used to obtain further baseline data on aquatic systems.

Fiscal Year 1987. Research will determine historic successional patterns and form a basis for restoring natural processes in park ecosystems. Inventories will be expanded to include stream systems and lake ecology. Baseline mapping of geologic features and processes will be accomplished.

Fiscal Year 1988. New research will consider the status of depressed mustelid populations and determine the ecological functioning of meadow vegetation types. Using baseline research of previous years, a park water resource management plan will be prepared.

Fiscal Year 1989. Procedures will be established for monitoring unstable rock formations in the Diamond Peak area. Drainage patterns historically disrupted will be restored based on aquatic research previously completed.

Summary. This five-year program will emphasize securing baseline information and in performing stop-gap management. Future years will emphasize resource management based on research performed during this period. Research emphasis can then shift from extensive to intensive needs indentified through previous monitoring and research.

NATURAL RESOURCES PROJECTS PROGRAMMING SHEET
LASSEN VOLCANIC NATIONAL PARK

(ON-GOING ONPS PROGRAMS)

April 1984

Project Costs in $1,000

Area Priority No.	Inc. No.	Pkg. No.	Ref. No.	Project Title	Action Type	Yr 1 Base	(85) New	Yr 2 Base	(86) New	Yr 3 Base	(87) New	Yr 4 Base	(88) New	Yr 5 Base	(89) New
			W-4	Geothermal Exploration Impact	Monit.	38		38		38					
				Program Management and Support	Mgmt.	17		17		17		17		17	
			RM-2	Beaver Census and Survey	Mgmt.	4		4		4		4		4	
			RM-3	Deer Herd and Range Monitoring	Monit.	8		8		8		8		8	
			RM-4	Bear Management	Mgmt.	4		4		4		4		4	
			RM-6	Monitor Natural Fire	Monit.	8		8		8		8		8	
			RM-11	Monitor Air Quality	Monit.	5.5		5.5		5.5		5.5		5.5	

NATURAL RESOURCES PROJECTS PROGRAMMING SHEET
LASSEN VOLCANIC NATIONAL PARK

(PROGRAMS REQUESTING ONPS FUNDING)

April 1984

Project Costs in $1,000

Area Priority No.	Inc. No.	Pkg. No.	Ref. No.	Project Title	Action Type	Yr 1 (85) Base	Yr 1 (85) New	Yr 2 (86) Base	Yr 2 (86) New	Yr 3 (87) Base	Yr 3 (87) New	Yr 4 (88) Base	Yr 4 (88) New	Yr 5 (89) Base	Yr 5 (89) New
1	800		RM-10	Monitor Backcountry Use	Monit.		12		12		12		12		12
2	806		RM-1	Monitor Endangered Raptors	Monit./ Mgmt.		5		5		5		5		5
3	122		N-33	Inventory Terrestrial Communities	Rsch.		20		20		20				
4	804		RM-8	Monitor Aquatic Ecosystems	Monit.		6		3		3		3		3
5	138		N-36	Survey Endangered Plants	Rsch.				20						
6	229		N-40	Inventory Aquatic Biota	Rsch.						20		20		
7	179		RM-5	Inventory Fuels	Mgmt.				22		22		22		22

NATURAL RESOURCES PROJECTS PROGRAMMING SHEET
LASSEN VOLCANIC NATIONAL PARK

April 1984

Project Costs in $1,000

Area Priority No.	Inc. No.	Pkg. No.	Ref. No.	Project Title	Action Type	Yr 1 (85) Base	Yr 1 (85) New	Yr 2 (86) Base	Yr 2 (86) New	Yr 3 (87) Base	Yr 3 (87) New	Yr 4 (88) Base	Yr 4 (88) New	Yr 5 (89) Base	Yr 5 (89) New
8	117		RM-7	Prescribed Fire	Mgmt.				10		10		10		10
9			N-37	Analyze Vegetation History	Rsch.						20				
10	230		N-42	Lake Ecology	Rsch.						20		20		
11	231		N-41	Inventory Streams	Rsch.						20		20		
12	228		W-3	Map Geologic Features	Rsch.						20		20		
13	232		N-38	Willow and Alder Ecology	Rsch.								20		20
14	234		W-1	Water Resource Survey	Rsch.								20		20
15	233		N-34	Meadow Ecology	Rsch.								20		20
16			N43	Wolverine and Fisher Survey	Rsch.								20		20
17			W-2	Monitor Diamond Peak	Rsch/Monit.										5
18			RM-9	Restore Drainage Patterns	Rsch.										5
19			N-35	Chaparral Ecology	Rsch.										20
20			N44	Bighorn Sheep Feasibility Study	Rsch.										20

LIST OF CONTINUING AND PROPOSED PROJECTS

Lassen Volcanic National Park

The following is a list of continuing and proposed projects. Resource management projects are coded "RM", natural science projects are coded "N" and geological and water resource projects are coded "W".

Reference Number	Project Title	Status of Project
RM-1	Monitor Endangered Raptors	Proposed FY85
RM-2	Beaver Census and Habitat Survey	Continuing
RM-3	Deer Herd and Habitat Monitoring	Continuing
RM-4	Bear Management	Continuing
RM-5	Forest Fuel Inventory	Proposed FY86
RM-6	Monitor Natural Fire	Continuing
RM-7	Prescribed Fire	Proposed FY86
RM-8	Monitor Aquatic Ecosystems	Proposed FY85
RM-9	Restore Historic Drainage Patterns	Proposed FY89
RM-10	Backcountry Use Monitoring	Proposed FY85
RM-11	Monitor Air Quality	Continuing
N-33	Inventory Terrestrial Communities	Proposed FY85
N-34	Meadow Ecology	Proposed FY88
N-35	Chaparral Ecology	Proposed FY89
N-36	Endangered Plant Survey	Proposed FY86
N-37	Analyze Vegetation History	Proposed FY87
N-38	Willow and Alder Ecology	Proposed FY88
N-40	Inventory Aquatic Biota	Proposed FY87
N-41	Resource Inventory - Streams	Proposed FY87
N-42	Lake Ecology	Proposed FY87
N-43	Wolverine and Fisher Status Survey	Proposed FY88
N-44	Bighorn Sheep Feasibility Study	Proposed FY89
W-1	Water Resources Plan	Proposed FY88
W-2	Monitor Diamond Peak	Proposed FY89
W-3	Map Geologic Features	Proposed FY87
W-4	Geothermal Exploration Impact	Continuing

NATURAL RESOURCES PROJECT STATEMENT

1. PARK AND REGION: Lassen Volcanic National Park, Western Region

2. PROJECT NAME AND NUMBER: Inventory Biotic Communities
LAVO-N-33

3. STATEMENT OF PROBLEM: The park has not been type mapped in the detail required for modern ecosystems management.

4. WHAT HAS BEEN DONE: In 1966 a forest stand map was completed and is accurate regarding forest tree composition but does not describe the diversity of species present nor recognize a number of important and unique communities. Roman Gankin (1973) mapped and described eight vegetation types on approximately 660 acres in connection with a ski area expansion proposa1.

5. DESCRIPTION OF THE WORK TO BE UNDERTAKEN: The entire park will have the biotic communities mapped and their compositions described at a level of intensity similar to that completed by Gankin (1973) on the Lassen Park Ski Area, except that species occurring year-around will be included instead of simply autumnal occurrences, and all significant biota will be described, not just vegetation. Means of monitoring change in the communities will be developed for implementation by the park staff following completion of the project.

6. LENGTH OF TIME NEEDED: Three years.

7. WHAT WILL HAPPEN IF NOT UNDERTAKEN: Park management will continue without knowing the constitution of some very basic resources and there will still be no means of realistically evaluating impacts of future management and visitor use activities.

8. WHAT ARE THE ALTERNATIVES:

    1. Do nothing.
    2. Map and describe gross vegetation types.

9. PERSONNEL: Contract Study.

10. ADMINISTRATION AND LOGISTICS:

Funding	Year in Program Sequence 1st	2nd	3rd	4th	5th
Personal Services	$ 00	$ 00	00		
Other than Personal Services	$20,000	$20,000	$20,000		
GRAND TOTAL	$20,000	$20,000	$20,000		

10. ADMINISTRATION AND LOGISTICS: (continued)

On Form		Date Submitted
10-237	X	1/13/78
10-238		
10-250		
10-451		

11. REFERENCES AND CONTACTS:

Ecolabs Associates, Davis, CA.

Gankin, R., 1973. A vegetation study, ski area, Mount Lassen Volcanic National Park. Ecolabs Associates, Davis, CA. 40 pp.

Anon, 1966. Forest Stand Composition Map. Lassen Volcanic National Park. Mineral, CA.

12. DATE SUBMITTED: October, 1977

NATURAL RESOURCES PROJECT STATEMENT

1. PARK AND REGION: Lassen Volcanic National Park, Western Region

2. PROJECT NAME AND NUMBER: Meadow Ecology
LAVO-N-34

3. STATEMENT OF PROBLEM: Grazing, recreational use and fire suppression have all contributed to alteration of some meadows in the park. The full effect of these impacts is not known. Neither are sufficient ecological base data available to influence future management planning.

4. WHAT HAS BEEN DONE: A limited amount of meadow classification has been done on 660 acres in the southwest section of the park. Three types of meadows (dry, damp and wet) have been mapped and general vegetation compositions described.

5. DESCRIPTION OF THE WORK TO BE UNDERTAKEN: Mapping, classification, and description of meadows is proposed in Project No. LAVO-N-33. Information from that study will form the basis for this anlaysis of the ecological relationships in meadow communities. Selected meadows representative of the three will be intensively studied.

6. LENGTH OF TIME NEEDED: Two years.

7. WHAT WILL HAPPEN IF NOT UNDERTAKEN: Management decisions will have to be made without adequate basic information. The extent of impacts resulting from current management and use will remain unknown.

8. WHAT ARE THE ALTERNATIVES: Do nothing.

9. PERSONNEL: University contract.

10. ADMINISTRATION AND LOGISTICS:

Funding	Year in Program Sequence 1st	2nd	3rd	4th	5th
Personal Services				$ 00	$ 00
Other than Personal Services				$20,000	$20,000
GRAND TOTAL				$20,000	$20,000
Funds Available in Park Base				$ 00	$ 00
Funds Requested from Regional Office				$20,000	$20,000

10. ADMINISTRATION AND LOGISTICS: (continued)

On Form		Date Submitted
10-237	233	4/6/83
10-238		
10-250		
10-451		

11. REFERENCES AND CONTACTS:

Gankin, R., 1973. A vegetation study, ski area, Mount Lassen Volcanic National Park, Ecolabs Assoc., Davis, CA. 40 pp.

Ecolabs Associates, Davis, CA.

12. DATE SUBMITTED: October, 1977

NATURAL RESOURCES PROJECT STATEMENT

1. PARK AND REGION: Lassen Volcanic National Park, Western Region

2. PROJECT NAME AND NUMBER: Chaparral Ecology
LAVO-N-35

3. STATEMENT OF PROBLEM: A sizeable amount of the park contains a chaparral vegetation type. Many of the stands are overmature and in others, fir trees have invaded and are suppressing the brush species. Fire suppression is known to be a principal cause of decadence and fir invasion, but other ecological relationships of this important type are little understood.

4. WHAT HAS BEEN DONE: Nothing has been done. Some stands are included in the proposed natural burn units (LAVO-RM-11) and others will have fuels evaluated in project (LAVO-RM-10).

5. DESCRIPTION OF THE WORK TO BE UNDERTAKEN: Mapping, classification and description of scrub communities is proposed in Project No. LAVO-N-33. Information from that study will form the basis for analysis of the ecological relationships in the chaparral communities. Selected sites will be intensively studied as representative of chaparral parkwide.

6. LENGTH OF TIME NEEDED: Two years.

7. WHAT WILL HAPPEN IF NOT UNDERTAKEN: Without an understanding of the basic relationships, it will not be possible to determine the primitive processes nor to restore them.

8. WHAT ARE THE ALTERNATIVES: The alternative is to not evaluate these communities.

9. PERSONNEL: University contract.

10. ADMINISTRATION AND LOGISTICS:

Funding	Year in Program Sequence 1st	2nd	3rd	4th	5th
Personal Services					$ 00
Other than Personal Services					$20,000
GRAND TOTAL					$20,000
Funds Available in Park Base					$ 00
Funds Requested from Regional Office					$20,000

10. ADMINISTRATION AND LOGISTICS: (continued)

On Form	Date Submitted
10-237	_____
10-238	_____
10-250	_____
10-451	_____

11. REFERENCES AND CONTACTS:

Parsons, D.J., 1976. Chaparral. Pacific Discovery. Mar./Apr. pp. 21-17.

Abrams, L. and R.S. Ferris. 1960. Illustrated flora of the pacific states. Vol. IV. Stanford Univ. Press. 732 pp.

Gillett, G.W., J.T. Howell and H. Leschke. 1961. A flora of Lassen Volcanic National Park, California. The Wasmann Journ. of Biol. 19(1):1-185.

Munz, P.A., and D.D. Keck. 1959. A California flora. Univ. of Calif. Press, Berkeley. 1681 pp.

12. DATE SUBMITTED: October, 1977

NATURAL RESOURCES PROJECT STATEMENT

1. PARK AND REGION: Lassen Volcanic National Park, Western Region

2. PROJECT NAME AND NUMBER: Endangered Plant Survey
LAVO-N-36

3. STATEMENT OF PROBLEM: The proposed Federal list of threatened and endangered plants, includes three species found in the park. In addition, the presence of nine subspecies on the Federal list needs to be confirmed. The Endangered Species Act requires protection of these plants on Federal lands. Investigators will also evaluate all other plants in the park that may need special protection.

4. WHAT HAS BEEN DONE: The three endangered species were listed and their occurrence at several locations noted in previous studies.

5. DESCRIPTION OF THE WORK TO BE UNDERTAKEN: Existing data need to be reviewed and locations checked for currency. Field investigations will be conducted to determine total extent of the three species' ranges in the park and the nine subspecies, will be checked to determine their status and the extent of their ranges. Habitat requirements will be determined for all twelve plants.

6. LENGTH OF TIME NEEDED: Two years.

7. WHAT WILL HAPPEN IF NOT UNDERTAKEN: Plans for perpetuating the species will have to be formulated without knowledge of where they occur and without sufficient information about their requirements.

8. WHAT ARE THE ALTERNATIVES: Do nothing and risk loss of several species from the park flora.

9. PERSONNEL: Contract.

10. ADMINISTRATION AND LOGISTICS:

Funding	Year in Program Sequence				
	1st	2nd	3rd	4th	5th
Personal Services		$ 00			
Other than Personal Services		$20,000			
GRAND TOTAL		$20,000			
Funds Available in Park Base		$ 00			
Funds Requested from Regional Office		$20,000			

10. ADMINISTRATION AND LOGISTICS: (continued)

	On Form	Date Submitted
10-237	X	1/13/78
10-238		
10-250		
10-451		

11. REFERENCES AND CONTACTS:

Jepson, W.L., 1951. A manual of the flowering plants of California. Univ. of Calif. Press, Berkeley. 1238 pp.

Gillett, G.W., J.T. Howell and H. Leschke. 1961. A Flora of Lassen Volcanic National Park, California. Univ. of San Francisco, 185 pp.

12. DATE SUBMITTED: October, 1977

NATURAL RESOURCES PROJECT STATEMENT

1. PARK AND REGION: Lassen Volcanic National Park, Western Region

2. PROJECT NAME AND NUMBER: Analyze Vegetation History
LAVO-N-37

3. STATEMENT OF PROBLEM: Restoration of primitive systems requires knowledge of the components of those systems; particularly the biotic components, some of which are known to have been extirpated due to modern man's activities.

4. WHAT HAS BEEN DONE: Reintroduction of natural fire is proposed to restore a non-biotic component to the park's ecosystems. The bighorn sheep has been tentatively determined to be an extirpated component.

5. DESCRIPTION OF THE WORK TO BE UNDERTAKEN: Historic research will be conducted to determine as nearly as possible the pre-Columbian composition of the park's ecosystems.

6. LENGTH OF TIME NEEDED: One year.

7. WHAT WILL HAPPEN IF NOT UNDERTAKEN: It will not be possible to realistically restore natural processes without knowledge of their composition.

8. WHAT ARE THE ALTERNATIVES: Do not research the historic composition.

9. PERSONNEL University contract.

10. ADMINISTRATION AND LOGISTICS:

Funding	Year in Program Sequence 1st	2nd	3rd	4th	5th
Personal Services		$	$ 00		
Other than Personal Services			$20,000		
GRAND TOTAL			$20,000		
Funds Available in Park Base			$ 00		
Funds Requested from Regional Office			$20,000		

10. ADMINISTRATION AND LOGISTICS: (continued)

On Form	Date Submitted
10-237	_____
10-238	_____
10-250	_____
10-451	_____

11. REFERENCES AND CONTACTS:

12. DATE SUBMITTED: October, 1977

NATURAL RESOURCES PROJECT STATEMENT

1. PARK AND REGION: Lassen Volcanic National Park, Western Region

2. PROJECT NAME AND NUMBER: Willow and Alder Ecology
LAVO-N-38

3. STATEMENT OF PROBLEM: Willow plants in the park generally are declining and deer utilization appears to be partly responsible, but other factors may be involved. Alder plants do not appear significant as deer food but may be important as fawning cover.

4. WHAT HAS BEEN DONE: An analysis of deer browse conditions in 1968 noted a general decline in willows in the park. The report did not suggest a cause, but recommended an in-depth study to determine cause since willow is an important deer food in the area. The analysis also suggested alder possibly is significant as cover during fawnings and should be studied also.

5. DESCRIPTION OF THE WORK TO BE UNDERTAKEN: Conduct ecological evaluation of selected alder-willow riparian scrub types to determine reason for decline and significance as cover for deer.

6. LENGTH OF TIME NEEDED: Two years.

7. WHAT WILL HAPPEN IF NOT UNDERTAKEN: Willow populations will continue to decline because of lack of management action which cannot be implemented without knowledge of reasons for decline.

8. WHAT ARE THE ALTERNATIVES: The alternative is to not study the type.

9. PERSONNEL: University contract.

10. ADMINISTRATION AND LOGISTICS:

Funding	Year in Program Sequence 1st	2nd	3rd	4th	5th
Personal Services				$ 00	$ 00
Other than Personal Services				$20,000	$20,000
GRAND TOTAL				$20,000	$20,000
Funds Available in Park Base				$ 00	$ 00
Funds Requested from Regional Office				$20,000	$20,000

10. ADMINISTRATION AND LOGISTICS: (continued)

	On Form	Date Submitted
10-237	232	4/6/83
10-238		
10-250		
10-451		

11. REFERENCES AND CONTACTS:

Gankin R., 1973. A vegetation study, ski area, Mount Lassen Volcanic National Park, unpub. NPS Doc. 40 pp.

Donart, G. B., 1968. Analysis of deer browse conditions and ecological relationships in Lassen Volcanic National Park.

12. DATE SUBMITTED: October, 1977

NATURAL RESOURCES PROJECT STATEMENT

1. PARK AND REGION: Lassen Volcanic National Park, Western Region

2. PROJECT NAME AND NUMBER: Inventory Aquatic Biota
LAVO-N-40

3. STATEMENT OF PROBLEM: Some water bodies in the park have had determinations made of the relative abundance of aquatic plants and animals, but a more detailed listing is needed to form a basis for monitoring change in the various systems.

4. WHAT HAS BEEN DONE: Only a few lakes have sufficient data bases to enable detection of gross changes by monitoring.

5. DESCRIPTION OF THE WORK TO BE UNDERTAKEN: Selected lakes and streams will be sampled to determine the biotic components and their abundance. The result should be comprehensive species lists of producer, decomposer and consumer organisms representing a reasonable cross section of the park's aquatic life. A report will be prepared that evaluates aquatic populations, identifies further research needs and makes recommendations for managing biological communities.

6. LENGTH OF TIME NEEDED: Three years.

7. WHAT WILL HAPPEN IF NOT UNDERTAKEN: Extrapolation of limited data will have to be relied upon to determine changes resulting from management and use. Deterioration of natural components may reach irreversible proportions before detection.

8. WHAT ARE THE ALTERNATIVES: Do not inventory.

9. PERSONNEL: University contract.

10. ADMINISTRATION AND LOGISTICS:

Funding	Year in Program Sequence 1st	2nd	3rd	4th	5th
Personal Services			$ 00	$ 00	
Other than Personal Services			$20,000	$20,000	
GRAND TOTAL			$20,000	$20,000	
Funds Available in Park Base			$ 00	$ 00	
Funds Requested from Regional Office			$20,000	$20,000	

10. ADMINISTRATION AND LOGISTICS: (continued)

On Form		Date Submitted
10-237	229	4/6/83
10-238		
10-250		
10-451		

11. REFERENCES AND CONTACTS:

12. DATE SUBMITTED: October, 1977

NATURAL RESOURCES PROJECT STATEMENT

1. PARK AND REGION: Lassen Volcanic National Park, Western Region

2. PROJECT NAME AND NUMBER: Resource Inventory - Streams
LAVO-N-41

3. STATEMENT OF PROBLEM: The park does not have a complete listing of streams, nor complete data on their general physical and biological components.

4. WHAT HAS BEEN DONE: Investigation of some of the larger streams relating to their existing and potential fisheries.

5. DESCRIPTION OF THE WORK TO BE UNDERTAKEN: A complete listing of all perennial and the more significant intermittent streams will be compiled. Determination will be made of their general physical properties and a listing of important biotic components will be prepared. A final report will be prepared that analyzes aquatic populations, identifies additional research needs and makes recommendations for managing biological communities.

6. LENGTH OF TIME NEEDED: Two years.

7. WHAT WILL HAPPEN IF NOT UNDERTAKEN: Management will have to continue without basic data. Monitoring for changes in these systems will not be possible.

8. WHAT ARE THE ALTERNATIVES: Do nothing.

9. PERSONNEL: University contract.

10. ADMINISTRATION AND LOGISTICS:

Funding	Year in Program Sequence 1st	2nd	3rd	4th	5th
Personal Services			$ 00	$ 00	
Other than Personal Services			$10,000	$10,000	
GRAND TOTAL			$10,000	$10,000	
Funds Available in Park Base			$ 00	$ 00	
Funds Requested from Regional Office			$10,000	$10,000	

10. ADMINISTRATION AND LOGISTICS: (continued)

	On Form	Date Submitted
10-237	231	4/6/83
10-238		
10-250		
10-451		

11. REFERENCES AND CONTACTS:

Everest, F.H., 1963. A survey of Horseshoe and Snag Lakes and their tributaries, Lassen Volcanic National Park. Unpub. NPS Doc., Mineral, California 47 pp.

Everest, F.H., 1964. A survey of Juniper Lake, Lassen Volcanic National Park. Unpub. NPS Doc., Mineral, California 33 pp.

12. DATE SUBMITTED: October, 1977

NATURAL RESOURCES PROJECT STATEMENT

1. PARK AND REGION: Lassen Volcanic National Park, Western Region

2. PROJECT NAME AND NUMBER: Lake Ecology
LAVO-N-42

3. STATEMENT OF PROBLEM: All lakes in the park of significant size have been altered to varying degrees by the introduction of fishes. Most of them have reverted to a fishless state; a few are still being stocked and seven now have self-regenerating trout populations.

4. WHAT HAS BEEN DONE: Three of the seven lakes supporting trout have undergone in-depth studies of some of the more significant ecological components.

5. DESCRIPTION OF THE WORK TO BE UNDERTAKEN: Four trout producing lakes will be studied to determine their biotic and abiotic components and to evaluate the ecological interrelationships. The results will be used in formulating future management plans.

6. LENGTH OF TIME NEEDED: Two years.

7. WHAT WILL HAPPEN IF NOT UNDERTAKEN: Management will have to continue based on extrapolations from other aquatic studies.

8. WHAT ARE THE ALTERNATIVES: Do not evaluate the lakes.

9. PERSONNEL: University contract.

10. ADMINISTRATION AND LOGISTICS:

Funding	Year in Program Sequence 1st	2nd	3rd	4th	5th
Personal Services			$ 00	$ 00	
Other than Personal Services			$20,000	$20,000	
GRAND TOTAL			$20,000	$20,000	
Funds Available in Park Base			$ 00	$ 00	
Funds Requested from Regional Office			$20,000	$20,000	

10. ADMINISTRATION AND LOGISTICS: (continued)

	On Form	Date Submitted
10-237	230	4/6/83
10-238		
10-250		
10-451		

11. REFERENCES AND CONTACTS:

Everest, F.H., 1963. A survey of Horseshoe and Snag Lakes and their tributaries, Lassen Volcanic National Park. Unpub. NPS Doc., Mineral, California 47 pp.

Everest, F.H., 1964. A survey of Juniper Lake, Lassen Volcanic National Park. Unpub. NPS Doc., Mineral, California 33 pp.

Hubbell, P.H., 1960. A survey of general biological conditions in a group of lakes in Lassen Volcanic National Park, Unpub. NPS Doc., Mineral, California 46 pp.

Hubbell, P.H. 1961. A survey of Mananita and Reflection Lakes, Lassen Volcanic National Park. Unpub. NPS Doc., Mineral, California 59 pp.

Wallis, O.L., 1955. Review of trout fishery situations, Lassen Volcanic National Park. Unpub. NPS Doc., Mineral, California 108 pp.

Wallis, O.L., 1959. Interpretation, research and management of the fishery resources, Lassen Volcanic National Park. Unpub. NPS Doc., Mineral, California, 37 pp.

12. DATE SUBMITTED: October, 1977

NATURAL RESOURCES PROJECT STATEMENT

1. PARK AND REGION: Lassen Volcanic National Park, Western Region

2. PROJECT NAME AND NUMBER: Wolverine and Fisher Status Survey
LAVO-N-43

3. STATEMENT OF PROBLEM: Both wolverines and fishers previously have been observed in the park, but neither has been reported recently. Although just south of the park, wolverines have been seen by reliable observers.

4. WHAT HAS BEEN DONE: Sight records are maintained in the park files. Bait stations designed to collect hairs have been used during winter, but hairs collected have not been those of fisher or wolverine.

5. DESCRIPTION OF THE WORK TO BE UNDERTAKEN: The status of both species, in and adjacent to the park, will be determined by field investigations and review of the literature. Habitat requirements will be determined and feasibility of their reintroduction will be studied.

6. LENGTH OF TIME NEEDED: Two years.

7. WHAT WILL HAPPEN IF NOT UNDERTAKEN: Reintroduction of these missing elements of the park's natural biota will not be possible without knowing what requirements must be satisfied for their well-being.

8. WHAT ARE THE ALTERNATIVES: Do not do the survey.

9. PERSONNEL: University contract.

10. ADMINISTRATION AND LOGISTICS:

Funding	Year in Program Sequence 1st	2nd	3rd	4th	5th
Personal Services				$ 00	$ 00
Other than Personal Services				$2,000	$2,000
GRAND TOTAL				$2,000	$2,000
Funds Available in Park Base				$ 00	$ 00
Funds Requested from Regional Office				$2,000	$2,000

10. ADMINISTRATION AND LOGISTICS: (continued)

On Form	Date Submitted
10-237	_____
10-238	_____
10-250	_____
10-451	_____

11. REFERENCES AND CONTACTS:

California Department of Fish and Game, Redding, California.

12. DATE SUBMITTED: October, 1977

NATURAL RESOURCES PROJECT STATEMENT

1. PARK AND REGION: Lassen Volcanic National Park, Western Region

2. PROJECT NAME AND NUMBER: Study Feasibility of Reintroducing Bighorn Sheep
LAVO-N-44

3. STATEMENT OF PROBLEM: Bighorn sheep are presently extinct in Lassen Park. The park is all high elevation and receives very heavy snowfall and accumulation so that migration of large mammals is essential to their survival.

4. WHAT HAS BEEN DONE: Leopold (1963) has stated that the species existed in the park.

5. DESCRIPTION OF THE WORK TO BE UNDERTAKEN: The feasibility of reintroducing migratory bighorn sheep in the park and adjacent national forest will need to be carefully evaluated. This study will require close cooperation of the Forest Service and the California Department of Fish and Game.

6. LENGTH OF TIME NEEDED: Two years.

7. WHAT WILL HAPPEN IF NOT UNDERTAKEN: Reintroduction of an interesting and important native species will not be possible without knowledge of habitat shortcomings both inside and outside the park.

8. WHAT ARE THE ALTERNATIVES: Do not study the feasibility of the reintroduction.

9. PERSONNEL: Contract.

10. ADMINISTRATION AND LOGISTICS:

Funding	Year in Program Sequence 1st	2nd	3rd	4th	5th
Personal Services					$ 00
Other than Personal Services					$20,000
GRAND TOTAL					$20,000
Funds Available in Park Base					$ 00
Funds Requested from Regional Office					$20,000

10. ADMINISTRATION AND LOGISTICS: (continued)

On Form	Date Submitted
10-237	_____
10-238	_____
10-250	_____
10-451	_____

11. REFERENCES AND CONTACTS:

Leopold, A.S., S.A. Cain, C.M. Cottam, I.N. Gabrielson and T.L. Kimball. 1963. Wildlife Management in the National Parks. Amer. For. 69(4): pp. 32-25, 61-63.

12. DATE SUBMITTED: October, 1977

NATURAL RESOURCES PROJECT STATEMENT

1. PARK AND REGION: Lassen Volcanic National Park, Western Region

2. PROJECT NAME AND NUMBER: Park Water Resources Management Plan
LAVO-W-1 (revision of former project W-1, Water Resources Survey)

3. STATEMENT OF PROBLEM: In compliance with Public Law 92-500 (Federal Water Pollution Control Act) and as amended by Public Law 95-217 (Clean Water Act of 1977) and as furthered by the Service Memorandum of Understanding with Environmental Protection Agency (EPA), each area must develop a Park Water Plan.

4. WHAT HAS BEEN DONE: No comprehensive water quality management plan has been developed for the area.

5. DESCRIPTION OF THE WORK TO BE UNDERTAKEN:

   a. An historical report on management of water resources in the park.

   b. Classification of all surface waters by present and proposed uses.

   c. An analysis of the present status of park waters, including:

      (1) Identification of water quality required to support specified uses and, where appropriate, to comply with or assist in establishing State water quality standards.

      (2) Relationship of water quality to any threatened, known, rare or endangered species indigenous to the park, and the relationship of water quality to the production of all natural resources.

   d. A description of proposed actions relating to management of park waters.

   e. A detailed plan for monitoring the quality of park waters that will reveal existing water quality and significant trends.

   Future coordination/cooperation with EPA and the State is required to ascertain established water standards.

6. LENGTH OF TIME NEEDED: Two years.

7. WHAT WILL HAPPEN IF NOT UNDERTAKEN: Service compliance with the above Federal laws.

8. WHAT ARE THE ALTERNATIVES: None.

9. PERSONNEL: Regional assistance with contracted U.S. Geolgical Survey to develop/initiate basic aspects. After which future monitoring will be done by area staff.

10. ADMINISTRATION AND LOGISTICS:

Funding	Year in Program Sequence 1st	2nd	3rd	4th	5th
Personal Services				$ 00	$ 00
Other than Personal Services				$20,000	$20,000
GRAND TOTAL				$20,000	$20,000
Funds Available in Park Base				$ 00	$ 00
Funds Requested from Regional Office				$20,000	$20,000

On Form		Date Submitted
10-237	234	4/6/81
10-238	809	8/26/81
10-250		
10-451		

11. REFERENCES AND CONTACTS:

12. DATE SUBMITTED: October, 1977
April, 1981

NATURAL RESOURCES PROJECT STATEMENT

1. PARK AND REGION: Lassen Volcanic National Park, Western Region

2. PROJECT NAME AND NUMBER: Monitor Potential Rockfall on Diamond Peak
LAVO-W-2

3. STATEMENT OF PROBLEM: Diamond Peak has several eroded outcroppings which appear to be detached boulders. At present, they are stable; however, erosional factors and earthquakes could dislodge these and create a threat to the park road and vista parking area below.

4. WHAT HAS BEEN DONE: The site has been evaluated by geologic consultants, Dames and Moore.

5. DESCRIPTION OF THE WORK TO BE UNDERTAKEN: The site will be evaluated further to determine what type of monitoring equipment is appropriate and monitoring procedures will be developed.

6. LENGTH OF TIME NEEDED: One year.

7. WHAT WILL HAPPEN IF NOT UNDERTAKEN: Stability of the outcroppings could deteriorate undetected and become a serious hazard to visitors using the park road.

8. WHAT ARE THE ALTERNATIVES: The "no action" alternative is to not monitor.

   Remove the outcroppings by mechanical means or by blasting at a time when visitor safety can be assured.

9. PERSONNEL: Contract geological consultants.

10. ADMINISTRATION AND LOGISTICS:

Funding	Year in Program Sequence 1st	2nd	3rd	4th	5th
Personal Services					$ 00
Other than Personal Services					$5,000
GRAND TOTAL					$5,000
Funds Available in Park Base					$ 00
Funds Requested from Regional Office					$5,000

10. ADMINISTRATION AND LOGISTICS: (continued)

On Form		Date Submitted
10-237		
10-238	X	8/26/75
10-250		
10-451		

11. REFERENCES AND CONTACTS:

Dames and Moore, Geological Consultants.

12. DATE SUBMITTED: February, 1979

NATURAL RESOURCES PROJECT STATEMENT

1. PARK AND REGION: Lassen Volcanic National Park, Western Region

2. PROJECT NAME AND NUMBER: Map Geologic Features
LAVO-W-3.

3. STATEMENT OF PROBLEM: Preservation and management of geologic features and phenomena requires an inventory of locations and extent of their features.

4. WHAT HAS BEEN DONE: The northern one-third of the park has been mapped by the U. S. Geological Survey.

5. DESCRIPTION OF THE WORK TO BE UNDERTAKEN: Map geological features and phenomena in the south two-thirds of the park in the same detail as that already completed for the north one-third of the park.

6. LENGTH OF TIME NEEDED: Two years.

7. WHAT WILL HAPPEN IF NOT UNDERTAKEN: Management will continue without basic knowledge about location and extent of features to be managed.

8. WHAT ARE THE ALTERNATIVES: The alternative is not to map.

9. PERSONNEL: Contract.

10. ADMINISTRATION AND LOGISTICS:

Funding	Year in Program Sequence 1st	2nd	3rd	4th	5th
Personal Services			$ 00	$ 00	
Other than Personal Services			$20,000	$20,000	
GRAND TOTAL			$20,000	$20,000	
Funds Available in Park Base			$ 00	$ 00	
Funds Requested from Regional Office			$20,000	$20,000	

On Form		Date Sumbitted
10-237	Inc. 228	4/6/83
10-238		
10-250		
10-451		

11. REFERENCES AND CONTACTS:

Crandell, D.R. and Mullineaux, D.L. 1970. Administrative report on geologic hazards at Lassen Volcanic National Park.

12. DATE SUBMITTED: February, 1979

NATURAL RESOURCES PROJECT STATEMENT

1. PARK AND REGION: Lassen Volcanic National Park, Western Region

2. PROJECT NAME AND NUMBER: Monitor Endangered Raptors
LAVO-RM-1

3. STATEMENT OF PROBLEM: The American peregrine falcon and the bald eagle historically nested extensively in the park. Periodic sightings of both mature and juvenile birds continue today. Peregrines infrequently hunt in the higher elevations in late summer. The east half of the park constitutes active nesting territory for bald eagles. Federal law requires that these species be protected on Federal lands.

4. WHAT HAS BEEN DONE: Sight records dating to 1964 are on file. Research documenting the extent of current use in the park by both species was completed in 1981. As mitigation for chairlift construction at the Lassen Park Ski Area, peregrine activity was monitored for two seasons to determine the extent that peregrines use the area for hunting and to determine if the chairlift cables constitute a hazard to hunting falcons. Results after two seasons are inconclusive. Breeding activity of bald eagles is monitored by resources management personnel incidental to other duties, so it is not consistently done.

5. DESCRIPTION OF THE WORK TO BE UNDERTAKEN: Weekly monitoring of falcon activity along the Lassen Peak-Brokeoff Mountain ridgeline will document hunting or nesting intensity and recommend visitor use or management restrictions commensurate with perpetuating historic levels of falcon use.

   Bald eagle nesting territory will be monitored during three periods each year: 1) early March to determine if nesting territories are being occupied, 2) late April-early May to confirm territory occupation, and 3) mid June to determine nesting success. Management actions will be adjusted as necessary to prevent disturbance of nesting and hunting eagles. In addition, the status of prey bases will be monitored to ensure availability of adequate supplies to maintain current raptor populations.

6. LENGTH OF TIME NEEDED: Continuing.

7. WHAT WILL HAPPEN IF NOT UNDERTAKEN: If management is not undertaken, these species may disappear from the park. Lacking information on their status will require managing with limited basic data, which may contribute to their extirpation from the park.

8. WHAT ARE THE ALTERNATIVES: The only alternative is to not monitor and manage with existing information.

9. PERSONNEL: 0.2 WY seasonal technicians.

10. ADMINISTRATION AND LOGISTICS:

Funding	Year in Program Sequence 1st	2nd	3rd	4th	5th
Personal Services	$4,000	$4,000	$4,000	$4,000	$4,000
Other than Personal Services	$1,000	$1,000	$1,000	$1,000	$1,000
GRAND TOTAL	$5,000	$5,000	$5,000	$5,000	$5,000
Funds Available in Park Base	$ 00	$ 00	$ 00	$ 00	$ 00
Funds Requested from Regional Office	$5,000	$5,000	$5,000	$5,000	$5,000

On Form	Date Submitted
10-237 806	3/84
10-238	
10-250	
10-451	

11. REFERENCES AND CONTACTS:

Baldridge, F., P. Detrich and C. van Riper, III. A survey of endangered raptorial birds in Lassen Volcanic National Park. Technical Report No. 9. Cooperative National Park Resources Studies Unit. University of California, Davis.

Dave Harlow, U.S. Fish and Wildlife Service, Sacramento, CA.

Ron Jurek, California Department of Fish and Game, Sacramento, CA.

Bob Lehman, U.S. Bureau of Land Management, Sacramento, CA.

12. DATE SUBMITTED: October, 1977
Revised April, 1984

NATURAL RESOURCES PROJECT STATEMENT

1. PARK AND REGION: Lassen Volcanic National Park, Western Region

2. PROJECT NAME AND NUMBER: Beaver Census and Habitat Survey
LAVO-RM-2

3. STATEMENT OF PROBLEM: Beaver are abundant in Warner Valley and are believed to be exotic. If historical research determines that the population is exotic, plans for their elimination will be developed which will require knowledge of population size and distribution.

4. WHAT HAS BEEN DONE: A preliminary reconnaissance has been completed in which the extent of the stream being used has been determined and location of most dams noted. Historic research was completed in 1982, and concluded that the beavers are not natives and recommended control.

5. DESCRIPTION OF THE WORK TO BE UNDERTAKEN: Map all beaver colony sites, including vegetation type, stream gradient and flow, dams, castor piles, canals, bank burrows, trails, food caches, cutover areas and live trees. Population numbers will be estimated based on numbers of active lodges and food caches. Willow, aspen and alder types will be cruised to determine basal area of each type.

6. LENGTH OF TIME NEEDED: Continuing.

7. WHAT WILL HAPPEN IF NOT UNDERTAKEN: Management of this population is desirable and cannot be effective without base data.

8. WHAT ARE THE ALTERNATIVES:

    1. Do not conduct the survey.
    2. Conduct census only and do not evaluate habitat.

9. PERSONNEL: Two technician, GS-4, 0.6 WY.

10. ADMINISTRATION AND LOGISTICS:

Funding	Year in Program Sequence				
	1st	2nd	3rd	4th	5th
Personal Services	$3,000	$3,000	$3,000	$3,000	$3,000
Other than Personal Services	$1,000	$1,000	$1,000	$1,000	$1,000
GRAND TOTAL	$4,000	$4,000	$4,000	$4,000	$4,000

10. ADMINISTRATION AND LOGISTICS: (continued)

Funding	Year in Program Sequence				
	1st	2nd	3rd	4th	5th
Funds Available in Park Base	$4,000	$4,000	$4,000	$4,000	$4,000
Funds Requested from Regional Office	$ 00	$ 00	$ 00	$ 00	$ 00

On Form	Date Submitted
10-237 X	1/13/78
10-238	
10-250	
10-451	

11. REFERENCES AND CONTACTS:

California Department of Fish and Game, Redding, CA.

Grinnell, Dixon and Linsdale. 1930. Vertebrate natural history of a section of Northern California through the Lassen Peak Region. Univ. of Calif. Press, Berkeley, CA.

Hall and Kelson. 1959. The mammals of North America. Ronald Press, New York.

Hensley, A. L. 1946. A progress report of beaver management in California. Dept. of Fish and Game. 32(2):87-99.

Kahl, J.R. 1969. Beaver habitat management plan. Lassen National Forest. Susanville, CA.

Miller and Kellog. 1955. List of North American recent mammals. Smithsonian Institute. Washington, D.C.

Tappe, D.T. 1942. The status of beavers in California. Game Bulletin No. 3. Calif. Dept. of Fish and Game. 59 pp.

12. DATE SUBMITTED: October, 1977

NATURAL RESOURCES PROJECT STATEMENT

1. PARK AND REGION: Lassen Volcanic National Park, Western Region

2. PROJECT NAME AND NUMBER: Deer Herd and Habitat Monitoring
LAVO-RM-3

3. STATEMENT OF PROBLEM: The park is summer range for large numbers of black-tailed and mule deer. In some areas, numbers appear excessive and some preferred browse species are declining.

4. WHAT HAS BEEN DONE: A biological reconnaissance in 1957 documented over-utilization in some areas of the park. In 1968, an analysis of deer browse condition concluded that over-utilization was occurring on some sites.

5. DESCRIPTION OF THE WORK TO BE UNDERTAKEN: Permanent transects will be established in key areas to assess annual forage supplies, degree of deer pressure and condition and trend of preferred and staple browse species. Herd composition counts will be made in spring and fall to determine fawn production and survival rates. Principal fawning areas will be mapped.

6. LENGTH OF TIME NEEDED: Continuing.

7. WHAT WILL HAPPEN IF NOT UNDERTAKEN: Insufficient information will be available for use in formulating deer management plans and management will be misdirected causing further deterioration of habitats.

8. WHAT ARE THE ALTERNATIVES: The alternative is to not monitor.

9. PERSONNEL: Total 43 WD/yr broken down as follows:

8 WD/yr for herd composition counts
10 WD/yr for fawning site search and monitor for change
20 WD/yr for reading transects
5 WD/yr for computation and data analysis

10. ADMINISTRATION AND LOGISTICS:

Funding	Year in Program Sequence				
	1st	2nd	3rd	4th	5th
Personal Services	$6,000	$6,000	$6,000	$6,000	$6,000
Other than Personal Services	$2,000	$2,000	$2,000	$2,000	$2,000
GRAND TOTAL	$8,000	$8,000	$8,000	$8,000	$8,000

10. ADMINISTRATION AND LOGISTICS: (continued)

Funding	Year in Program Sequence				
	1st	2nd	3rd	4th	5th
Funds Available in Park Base	$8,000	$8,000	$8,000	$8,000	$8,000
Funds Requested from Regional Office	$ 00	$ 00	$ 00	$ 00	$ 00

On Form		Date Submitted
10-237	X	1/13/78
10-238		
10-250		
10-451		

11. REFERENCES AND CONTACTS:

Sumner, L., 1957. Biological Reconnaissance of Lassen Volcanic National Park. Unpub. NPS Doc. 11 pp.

Donart, G.C., 1968. Analysis of deer browse conditions and ecological relationships in Lassen Volcanic National Park. Humboldt State College, Arcata, 66. 48 pp.

Anon. 1969. USDA Forest Service. California Region Range Environmental Analysis Handbook.

Anon. 1963. Deer management handbook. State of Calif. Dept. of Fish and Game. iii + 77 pp.

12. DATE SUBMITTED: October, 1977

NATURAL RESOURCES PROJECT STATEMENT

1. PARK AND REGION: Lassen Volcanic National Park, Western Region

2. PROJECT NAME AND NUMBER: Bear Management
LAVO-N-4

3. STATEMENT OF PROBLEM: A small population of black bears include the park as part of their territory. During the summer months when visitors are numerous and bears are active, occasions of man-bear incidents occur at varying levels each year. In recent years, no bear related personal injuries have occurred, but the potential exists.

4. WHAT HAS BEEN DONE: All open pit garbage disposal sites in the park have been closed and metal bin collection sites are used for short accumulation periods, then hauled to disposal sites outside the park. Bear-proof garbage can covers have been purchased and will be installed. Information on human behavior relating to bears is distributed at entrance stations and visitor centers. Interpretive talks include discussion of bear behavior.

5. DESCRIPTION OF THE WORK TO BE UNDERTAKEN: Install bear-proof lids on garbage cans. Develop a formal, detailed reporting procedure for bear incidents. Intensify visitor education efforts. Continue close coordination with California Department of Fish and Game in relocating problem animals.

6. LENGTH OF TIME NEEDED: Continuing.

7. WHAT WILL HAPPEN IF NOT UNDERTAKEN: As visitor numbers increase, the opportunity for bear encounters will also. Unprotected cans will remain as targets of foraging bears. Relocation will not be effective because of the small size of the park unless cooperative efforts are maintained.

8. WHAT ARE THE ALTERNATIVES: Continue at the present level of management.

9. PERSONNEL: Day labor force to install bear-proof lids. Other aspects of the proposal can be accomplished with current staff.

10. ADMINISTRATION AND LOGISTICS:

Funding	Year in Program Sequence 1st	2nd	3rd	4th	5th
Personal Services	$3,000	$3,000	$3,000	$3,000	$3,000
Other than Personal Services	$1,000	$1,000	$1,000	$1,000	$1,000
GRAND TOTAL	$4,000	$4,000	$4,000	$4,000	$4,000
Park Base	$4,000	$4,000	$4,000	$4,000	$4,000
Funds Requested from Regional Office	$ 00	$ 00	$ 00	$ 00	$ 00

On Form	Date Submitted
10-237	_____
10-238	_____
10-250	_____
10-451	_____

11. REFERENCES AND CONTACTS:

Riegelhuth, Richard. Yosemite National Park.

12. DATE SUBMITTED: October, 1977

NATURAL RESOURCES PROJECT STATEMENT

1. PARK AND REGION: Lassen Volcanic National Park, Western Region

2. PROJECT NAME AND NUMBER: Forest Fuel Inventories, LAVO-RM-5

3. STATEMENT OF PROBLEM: Preparing fire prescriptions or determining suitability of forest stands for inclusion in natural fire units, depends on amount and kinds of fuels they contain.

4. WHAT HAS BEEN DONE: Approximately 30% of the park has been delineated as natural burn zone based on fire history, fuel loadings and discontinuities and research elsewhere in similar types.

5. DESCRIPTION OF THE WORK TO BE UNDERTAKEN: Forest fuel typing will be accomplished by field sampling and aerial photographic evaluation and mapping. Methods used will follow those developed at Sequoia and Yosemite National Parks.

6. LENGTH OF TIME NEEDED: Three years.

7. WHAT WILL HAPPEN IF NOT UNDERTAKEN: Restoration of natural fire to the forest ecosystems will be delayed further. Continuing accumulation of fuels may lead to unnatural and catastrophic wildfires.

8. WHAT ARE THE ALTERNATIVES: Do not inventory forest fuels.

9. PERSONNEL: Six Park Technicians for 0.3 WY each for three years.

10. ADMINISTRATION AND LOGISTICS:

Funding	Year in Program Sequence				
	1st	2nd	3rd	4th	5th
Personal Services	0	$20,000	$20,000	$20,000	$20,000
Other than Personal Services	0	$ 2,000	$ 2,000	$ 2,000	$ 2,000
GRAND TOTAL	0	$22,000	$22,000	$22,000	$22,000
Funds Available in Park Base	0	$ 00	$ 00	$ 00	$ 00
Funds Requested from Regional Office	0	$22,000	$22,000	$22,000	$22,000

10. ADMINISTRATION AND LOGISTICS: (continued)

	On Form	Date Submitted
10-237	179	4/6/83
10-238		
10-250		
10-451		

11. REFERENCES AND CONTACTS:

Aldrich and Mutch. 1973. Wilderness fire management; planning guidelines and inventory procedures. USDA, Forest Service, Northern Region. 35 pp. +App.

Kilgore, B.M., 1971. The role of fire in managing red fir forests, Trans. 36. N.A. Wildl. and Nat. Res. Conf., Wildl. Mgmt. Institute, Washington, D.C. pp. 405-416

Murphy, R.W., 1967. Experimental burning in park management. Proc. Calif. Tall Timbers., Fire Ecol. Conf. pp. 207-216.

Kilgore, B.M., 1976. From fire control to fire management. Trans. 41. N. A. Wildl. and Nat. Res. Confl, Wildl. Mgmt. Insti., Washington, D.C.

Kilgore, B.M. 1973. The ecological role of fire in Sierran conifer forests: Its applications to Natl. Park Mgmt. Quaternary Research 3(3): 496-513

Parsons, D. J. 1977. The role of fire in park management. Parks 2(1): 1-4.

Countryman, C.M. Moisture in living fuels affects fire behavior. Fire Mgmt. Spring 1974. pp. 10-13.

12. DATE SUBMITTED: October, 1977

NATURAL RESOURCES PROJECT STATEMENT

1. PARK AND REGION: Lassen Volcanic National Park, Western Region

2. PROJECT NAME AND NUMBER: Monitor Natural Fires
LAVO-RM-6

3. STATEMENT OF PROBLEM: All fire occurring in the park have been suppressed for the past 70 years. It is proposed that naturally occurring fires will be allowed to function naturally which will require monitoring to obtain data on behavior.

4. WHAT HAS BEEN DONE: Natural fire units have been established which include alpine, subalpine and red fir types. Perimeters of the units have been established to provide buffer to park boundaries and to protect high hazard areas until fire prescriptions can be prepared for them.

5. DESCRIPTION OF THE WORK TO BE UNDERTAKEN: All fires will be assessed as soon after ignition as possible by dispatching personnel trained in assessment, monitoring and control activities. If a fire is located inside a Natural Fire Unit, its potential for escape will be assessed, and it will be classed as either a wildfire or management fire. Immediate suppression will be taken on wildfires. If the classification is management fire, monitoring of predetermined parameters will be started. Monitoring will be done on the ground at the fire site and by remote observation. Since Natural Burn Zone boundaries in some cases abut Lassen National Forest lands, cooperative agreements will be developed with the Forest Sevice before any fire is permitted to burn near such boundaries.

6. LENGTH OF TIME NEEDED: Continuing.

7. WHAT WILL HAPPEN IF NOT UNDERTAKEN: Natural fires would either be suppressed or would burn unobserved. Valuable data for future management decisions would be lost and potential for escape or uncontrollable dimensions could occur undetected.

8. WHAT ARE THE ALTERNATIVES: Do not monitor.

9. PERSONNEL: An additional 0.3 WY of seasonal Fire Technician will be needed.

10. ADMINISTRATION AND LOGISTICS: (continued)

Funding	Year in Program Sequence 1st	2nd	3rd	4th	5th
Personal Services	$6,000	$6,000	$6,000	$6,000	$6,000
Other than Personal Services	$2,000	$2,000	$2,000	$2,000	$2,000
GRAND TOTAL	$8,000	$8,000	$8,000	$8,000	$8,000
Funds Available in Park Base	$8,000	$8,000	$8,000	$8,000	$8,000
Funds Requested from Regional Office	$ 00	$ 00	$ 00	$ 00	$ 00

On Form		Date Submitted
10-237	X	1/13/78
10-238		
10-250		
10-451		

11. REFERENCES AND CONTACTS:

Kilgore, B.M., 1971. The role of fire in managing red fir forests, Trans. 36. N.A. Wildl. and Nat. Res. Conf., Wildl. Mgmt. Institute, Washington, D.C. pp. 405-416

Kilgore, B.M., 1976. From fire control to fire management. Trans. 41. N. A. . Wildl. and Nat. Res. Conf., Wildl. Mgmt. Insti., Washington, D.C.

Kilgore, B.M., 1973. The ecological role of fire in Sierran conifer forests. Quaternary Research 3: 496-513.

Parsons, D.J., 1977. The role of fire in park management. Parks 2(1):1-4.

Agee, J.K., 1974. Fire management in the national parks. Western Wildlands 1(3):27-33.

Kilgore, B.M., 1975. Restoring fire to national park wilderness. American Forests. Mar. 1975.

Kilgore, B.M. and Briggs, G.S., 1972. Restoring fire to high elevation forests in California. Journal Forestry 70(5).

12. DATE SUBMITTED: October, 1977

NATURAL RESOURCES PROJECT STATEMENT

1. PARK AND REGION: Lassen Volcanic National Park, Western Region

2. PROJECT NAME AND NUMBER: Prescribed Fire
LAVO-RM-7

3. STATEMENT OF PROBLEM: Many forest types in the park have been considerably altered as a result of effective fire suppression. Fuel accumulations in some types have reached unnaturally high levels; in others, successional changes have accelerated so that some stands, such as fire perpetuated chaparral and mixed conifer forests are being replaced by dense stands of white fir.

4. WHAT HAS BEEN DONE: A forest stand composition map has been completed for the park and shows percent cover of tree species. Initial natural fire units have been delineated and first priority prescribed fire units have been located generally in the following areas: Hat Creek/Badger Flat; Pilot/Saddle Mountains; Manzanita Lake/Table Mountain; Flatiron Ridge; Lost Creek Flats; Snag Lake; Horseshoe Lake; Kings Creek Meadows; and Dersch Meadows.

5. DESCRIPTION OF THE WORK TO BE UNDERTAKEN: Fires will be ignited under specified weather and fuel conditions in order to meet management requirements. Fuel inventories are proposed in Project RM-5 and will be utilized in developing fire prescriptions. Initial prescribed fire projects can be started before fuel inventories are completed because some vegetation and fuel types are enough like similar types in other national parks for which prescriptions already are available. It will only be necessary to have National Park Service fire scientists approve the prescriptions for those sites in Lassen.

   Initially prescribed fire will be employed in unique ecosystems in high visitor use areas, and in high fuel hazard areas. This phase will require burning in four vegetation types: meadow, chaparral Jeffrey pine forest and lodgepole pine forest. After the initial phase is being handled on a routine basis, the program will be expanded to include all remaining natural areas of the park.

   The ultimate objective of the prescribed fire program is to prepare all natural areas of the park so that they can be included in the natural fire zone.

   Fire prescriptions will include provisions for locating and protecting cultural resources in all areas proposed for burning.

6. LENGTH OF TIME NEEDED: Continuing.

7. WHAT WILL HAPPEN IF NOT UNDERTAKEN: Fuel loadings will continue to build up increasing the potential for devastating fire. Eventually many of the intermediate successional stages will disappear from the park. Wildlife habitat will be further limited.

8. WHAT ARE THE ALTERNATIVES: Continue total suppression outside of natural burn zones.

9. PERSONNEL: Existing staff.

10. ADMINISTRATION AND LOGISTICS:

Funding	Year in Program Sequence 1st	2nd	3rd	4th	5th
Personal Services		$ 00	$ 00	$ 00	$ 00
Other than Personal Services		$10,000	$10,000	$10,000	$10,000
GRAND TOTAL		$10,000	$10,000	$10,000	$10,000
Funds Available in Park Base		$ 00	$ 00	$ 00	$ 00
Funds Requested from Regional Office		$10,000	$10,000	$10,000	$10,000

On Form		Date Submitted
10-237	X	1/13/78
10-238		
10-250		
10-451		

11. REFERENCES AND CONTACTS:

Van Wagtendonk, J., Yosemite National Park, CA.

Aldrich and Mutch. 1973. Wilderness fire management; planning guidelines and inventory procedures. USDA, Forest Service, Northern Region. 35 pp. +App.

Murphy, R.W. 1967. Experimental burning in park management. Proc. Calif. Tall Timbers, Fire Ecol. Conf. pp. 207-216.

Kilgore, B.M., 1971. The role of fire in managing red fir forests, Trans. 36. N.A. Wildl. and Nat. Res. Conf., Wildl. Mgmt. Institute, Washington, D.C. pp. 405-416

Countryman, C.M., 1974. Moisture living fuels affects fire behavior. Fire Mgmt. Spring 1974. pp. 10-13.

12. DATE SUBMITTED: October, 1977

NATURAL RESOURCES PROJECT STATEMENT

1. PARK AND REGION: Lassen Volcanic National Park, Western Region

2. PROJECT NAME AND NUMBER: Monitor Aquatic Ecosystems
LAVO-RM-8

3. STATEMENT OF PROBLEM: All of the larger lakes and several smaller lakes have been altered by the introduction of non-native fishes, and other lakes and streams have had physical properties altered by management and visitor use activities. The effects of these alterations are not known, especially as they relate to long-term alterations of the natural aquatic systems.

4. WHAT HAS BEEN DONE: A considerable amount of data regarding physical and biological compositions have been gathered during fisheries investigations on a number of lakes and streams in the park.

5. DESCRIPTION OF THE WORK TO BE UNDERTAKEN: Implement a schedule of monitoring physical and biotic features of those water bodies for which much of the basic data are now available. The purpose of monitoring will be detection of changes in the system so that necessary remedial measures may be taken. Features to be monitored include: depth, volume, temperature, dissolved oxygen, alkalinity, bottom types, pool sizes and number, riffle sizes and number, cover and shading, food densities, fish species and their relative abundance, conditions and creel census.

6. LENGTH OF TIME NEEDED: Continuing.

7. WHAT WILL HAPPEN IF NOT UNDERTAKEN: Detrimental effects of management and use will continue undetected, or the true significance of deterioration will not be correctly evaluated.

8. WHAT ARE THE ALTERNATIVES: 1) Do not monitor. 2) Monitor only those bodies showing obvious deterioration.

9. PERSONNEL: Two Park Technicians committed 0.2 WY annually to aquatic monitoring.

10. ADMINISTRATION AND LOGISTICS:

Funding	Year in Program Sequence				
	1st	2nd	3rd	4th	5th
Personal Services	$2,000	$2,000	$2,000	$2,000	$2,000
Other than Personal Services	$4,000	$1,000	$1,000	$1,000	$1,000
GRAND TOTAL	$6,000	$3,000	$3,000	$3,000	$3,000

10. ADMINISTRATION AND LOGISTICS: (continued)

Funding	Year in Program Sequence 1st	2nd	3rd	4th	5th
Funds Available in Park Base	$ 00	$ 00	$ 00	$ 00	$ 00
Funds Requested from Regional Office	$6,000	$3,000	$3,000	$3,000	$3,000

On Form		Date Submitted
10-237	X	1/13/78
10-238		
10-250		
10-451		

11. REFERENCES AND CONTACTS:

Grey, D.M. ed: 1970. Handbook on the Principals of Hydrology. Ottawa, National Research Council of Canada.

Hall, J.D. and Baker, C.O. Biological Impacts of organic debris in pacific northwest streams. Oregon State University, Corvallis, OR, 3 pp.

12. DATE SUBMITTED: October, 1977

NATURAL RESOURCES PROJECT STATEMENT

1. PARK AND REGION: Lassen Volcanic National Park, Western Region

2. PROJECT NAME AND NUMBER: Restore Historic Drainage Patterns
LAVO-RM-9

3. STATEMENT OF PROBLEM: Three water system in the park have been altered by modern man. Manzanita Lake was dammed to provide water power. A diversion ditch was constructed from Manzanita Creek to Reflection Lake to improve fish production. Water flow in the Drakesbad Meadow was altered to increase range production for livestock grazing.

4. WHAT HAS BEEN DONE: Nothing.

5. DESCRIPTION OF THE WORK TO BE UNDERTAKEN: The altered lakes have historic base so they will be monitored for possible contribution to adverse impacts on related resources, and if no impacts occur, natural succession will be allowed to continue. The extent of alteration in the Drakesbad Meadow will be determined and historic flow patterns physically restored.

6. LENGTH OF TIME NEEDED: Two summer seasons.

7. WHAT WILL HAPPEN IF NOT UNDERTAKEN: Monitoring of altered lakes will not be done and changes occurring may continue undetected. Altered drainage in Warner Valley will continue to alter the species composition and distribution of the meadow.

8. WHAT ARE THE ALTERNATIVES: Allow succession to act upon the alterations.

9. PERSONNEL: Day labor will accomplish restoration. Assessing extent of alteration will be accomplished by existing staff.

10. ADMINISTRATION AND LOGISTICS:

Funding	Year in Program Sequence 1st	2nd	3rd	4th	5th
Personal Services					$ 00
Other than Personal Services					$5,000
GRAND TOTAL					$5,000

10. ADMINISTRATION AND LOGISTICS: (continued)

Funding	Year in Program Sequence 1st	2nd	3rd	4th	5th
Funds Available in Park Base					$ 00
Funds Requested from Regional Office					$5,000

On Form	Date Submitted
10-237	_____
10-238	_____
10-250	_____
10-451	_____

11. REFERENCES AND CONTACTS:

12. DATE SUBMITTED: October, 1977

NATURAL RESOURCES PROJECT STATEMENT

1. PARK AND REGION: Lassen Volcanic National Park, Western Region

2. PROJECT NAME AND NUMBER: Backcountry Use Monitoring
LAVO-RM-10

3. STATEMENT OF PROBLEM: Backcountry use, particularly overnight use, is causing damage to resources at many sites. Loss of vegetation, soil compaction and increasing sediment loads in water bodies are some of the obvious impacts, but their full extent is not known.

4. WHAT HAS BEEN DONE: An approved Wilderness and Backcountry Use Plan is in effect which provides restrictions on use. These restrictions are somewhat arbitrary; not being based on correlation between use and resource impact.

5. DESCRIPTION OF THE WORK TO BE UNDERTAKEN: Monitoring procedures will be designed to gather the following kinds of data: areas of bare soil, trampled vegetation, firewood gathering, tree damage, trash dispersal, numbers and kinds of user constructed facilities, water quality, vegetation type and topography. These data will be compared to use statistics so that more realistic controls can be implemented. Monitoring will continue beyond initial phase so that environmental changes are detected before they become excessive.

6. LENGTH OF TIME NEEDED: Continuing.

7. WHAT WILL HAPPEN IF NOT UNDERTAKEN: Control will continue to be imposed on a trial and error basis and adverse user impacts may become excessive before they are detected.

8. WHAT ARE THE ALTERNATIVES: The only alternative is to do nothing.

9. PERSONNEL: 0.6 WY seasonal technicians annually.

10. ADMINISTRATION AND LOGISTICS:

Funding	Year in Program Sequence				
	1st	2nd	3rd	4th	5th
Personal Services	$ 9,000	$ 9,000	$ 9,000	$ 9,000	$ 9,000
Other than Personal Services	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000
GRAND TOTAL	$12,000	$12,000	$12,000	$12,000	$12,000

10. ADMINISTRATION AND LOGISTICS: (continued)

Funding	Year in Program Sequence 1st	2nd	3rd	4th	5th
Funds Available in in Park Base	$ 00	$ 00	$ 00	$ 00	$ 00
Funds Requested from Regional Office	$12,000	$12,000	$12,000	$12,000	$12,000

On Form	Date Submitted
10-237 800	4/6/83
10-238	
10-250	
10-451	

11. REFERENCES AND CONTACTS:

Bratton, S. Visitation patterns and campsite damage in the Great Smokies. Unpub. NPS Doc.

12. DATE SUBMITTED October, 1977

NATURAL RESOURCES PROJECT STATEMENT

1. PARK AND REGION: Lassen Volcanic National Park, Western Region

2. PROJECT NAME AND NUMBER: Monitor Air Quality
LAVO-RM-11

3. STATEMENT OF PROBLEM: The park has been designated a Class I area (no significant deterioration permissible) in 1977 amendments to the Clean Air Act. The park airshed is generally high quality, but until 1982, was not actually monitored for possible pollutants and baseline data to substantiate the conditions was not available.

4. WHAT HAS BEEN DONE: Monitoring of visual range and visibility-impairing particulates was initiated in 1982 in order to acquire baseline information on this most important air quality related value in the park.

5. DESCRIPTION OF THE WORK TO BE UNDERTAKEN: Monitoring equipment has been placed at selected locations in the park. The equipment consists of a manual multiwave telephotometer to measure visual range within the park, and a model SFS-500 fine particulate monitor to sample visibility impairing particles. This installation is a part of the NPS Air Quality Division's Regional Visibility Monitoring Network.

6. LENGTH OF TIME NEEDED: Continuing.

7. WHAT WILL HAPPEN IF NOT UNDERTAKEN: Legal requirements to maintain Class I air quality could not be maintained without monitoring existing pollutant levels and detecting any changes in those levels.

8. WHAT ARE THE ALTERNATIVES: The "no action" alternative is to not monitor. Other alternatives are to establish very few monitoring sites or to attempt saturation with monitoring stations.

9. PERSONNEL: 0.5 WY seasonal technician to maintain stations and tabulate data.

10. ADMINISTRATION AND LOGISTICS:

Funding	Year in Program Sequence				
	1st	2nd	3rd	4th	5th
Personal Services	$5,500	$5,500	$5,000	$5,500	$5,500
Other than Personal Services	~~$5,000~~	~~$5,500~~	~~$5,500~~	~~$5,500~~	~~$5,500~~
GRAND TOTAL	$5,500	5,500	$5,500	$5,500	$5,500

10. ADMINISTRATION AND LOGISTICS: (continued)

Funding	Year in Program Sequence 1st	2nd	3rd	4th	5th
Funds Available in Park Base	$ 00	$ 00	$ 00	$ 00	$ 00
Funds Requested from Regional Office	~~$11,000~~ 5,000	~~$11,000~~ 5,000	~~$11,000~~ 5,000	~~$11,000~~ 5,000	~~$11,000~~ 5,000

On Form	Date Submitted
10-237	
10-238	
10-250	
10-451	

11. REFERENCES AND CONTACTS:

Don Christensen, NPS Western Region Air Quality Coordinator.

State of California Air Resources Board, 1907 11th Street, Sacramento, CA 95814.

Clean Air Act of 1970 and 1977 Amendment.

12. DATE SUBMITTED: February, 1979
Revised April, 1984

NATURAL RESOURCES PROJECT STATEMENT

1. PARK AND REGION: Lassen Volcanic National Park, Western Region

2. PROJECT NAME AND NUMBER: Geothermal Exploration Impact
LAVO-W-4

3. STATEMENT OF PROBLEM: Lassen National Forest proposes leasing lands adjacent to Lassen Park for geothermal development. NPS is concerned that exploration drilling or development may adversely affect the thermal resources within the park and the esthetic qualities of the general area.

4. WHAT HAS BEEN DONE: Investigations by U.S.G.S. have delineated the volcanic history of the area and the chemical charactistics of the surficial thermal features. Various geophysical studies, as well as results obtained in a 1200m deep drill hole near Terminal Geyser, provide additional data on subsurface conditions.

5. DESCRIPTION OF THE WORK TO BE UNDERTAKEN: Continue chemical monitoring begun in FY82. Remeasure the gravity network set up in 1982 twice during 1984 to verify gravity stability and to assess the level of seasonal gravity fluctuation. Products will include:

   A report of the chemistry of the samples collected.

   A report of the gravity measurement.

   A report of the gravity resurveys.

6. LENGTH OF TIME NEEDED: One year.

7. WHAT WILL HAPPEN IF NOT UNDERTAKEN: There will not be sufficient data available to predict affects of exploration and development on park thermal resources.

8. WHAT ARE THE ALTERNATIVES: The only alternative is to not monitor.

9. PERSONNEL: Contract.

10. ADMINISTRATION AND LOGISTICS:

Funding	Year in Program Sequence				
	1st	2nd	3rd	4th	5th
Personal Services	$38,000	$38,000	$38,000		
Other than Personal Services	$38,000	$38,000	$38,000		
GRAND TOTAL	$38,000	$38,000	$38,000		

10. ADMINISTRATION AND LOGISTICS: (continued)

Funding	Year in Program Sequence 1st	2nd	3rd	4th	5th
Funds Available in Park Base	$ 00	$ 00	$ 00		
Funds Requested from Regional Office	$38,000	$38,000	$38,000		

On Form	Date Submitted
10-237	
10-238 803	7/13/81
10-250	
10-451	

11. REFERENCES AND CONTACTS:

U.S. Geologocial Survey, 345 Middlefield Road, Menlo Park, CA 94025.

12. DATE SUBMITTED: January, 1983